

DEPARTMENT OF TRANSPORTATION

DES-OE MS #43
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September 4, 2003

04-SF-80-12.6/13.2
04-0120R4
ACBRIM-080-1(097)N

Addendum No. 9

Dear Contractor:

This addendum is being issued to the contract for construction on State highway in IN THE CITY AND COUNTY OF SAN FRANCISCO FROM YERBA BUENA TUNNEL TO 0.6 KM EAST OF THE YERBA BUENA TUNNEL.

Submit bids for this work with the understanding and full consideration of this addendum. The revisions declared in this addendum are an essential part of the contract.

Bids for this work will be opened on October 15, 2003, instead of the date of September 16, 2003.

This addendum is being issued to set a new bid opening date as shown herein, revise the Project Plans, the Notice to Contractors and Special Provisions, and the Proposal and Contract.

Project Plan Sheets 2, 5, 8, 11, 12, 13, 16, 19, 37, 38, 39, 47, 50, 59, 63, 67, 69, 70, 71, 75, 76, 78, 79, 80, 81, 96, 97, 98, 101, 102, 104, 106, 108, 109, 110, 111, 115, 116, 122, 123, 124, 125, 126, 133A, 134A, 142, 143, 147, 149, 151, 162, 165, and 166 are revised. Half-sized copies of the revised sheets are attached for substitution for the like-numbered sheets.

Project Plan Sheets 23A, 89A, 89B, 89C, 89D, 89E, 115A, 135A, 135B, 135C, 135D, 135E, 135F, 135G, 135H, 135I, 135J, 135K, 135L, 135M, 135N, 135O, 135P, 136A, 136B, 136C, and 136D are added. Half-sized copies of the added sheets are attached for addition to the project plans.

Project Plan Sheet 139 is deleted.

In the Special Notices, "**Submission of DBE Information**", the following notices are added:

"Effective September 2, 2003, Triaxial Management Services will no longer provide lists of certified DBEs to contractors bidding on projects or provide DBEs with assistance in preparing bids for subcontracting or supplying materials. Triaxial provided these services for contracts in Districts 01, 02, 03, 04, 05 (except San Luis Obispo and Santa Barbara Counties), 06 (except Kern County), 09 and 10.

Contractors bidding on projects in these Districts may obtain lists of certified DBEs from the Department's Website at <http://www.dot.ca.gov/hq/bep>. The Department also publishes a quarterly directory of certified firms that may be ordered from the Publications Unit at (916) 445-3520.

Contractors bidding on projects with DBE goals in Districts 05 (San Luis Obispo and Santa Barbara Counties), 06 (Kern County), 07, 08, 11 and 12 may continue to call Padilla & Associates at the telephone numbers listed in the Special Provisions."

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In the Special Provisions, Section 2-1.02A, "DBE GOALS FOR THIS PROJECT," the third paragraph is revised as follows.

" The following firms may be contacted for projects in the following locations:

| | |
|--|--|
| Districts 04, 05 (except San Luis Obispo and Santa Barbara Counties), 06 (except Kern County) and 10: | Districts 08 and 11: |
| See the Department's DBE database at: http://www.dot.ca.gov/hq/bep/ | Padilla & Associates - San Diego 2725 Congress Street, Suite 1D San Diego, CA 92110 Telephone: (619) 725-0843 FAX No.: (619) 725-0854 |
| Districts 07, 08, and 12; in San Luis Obispo and Santa Barbara Counties in District 05; and in Kern County in District 06: | Districts 01, 02, 03 and 09: |
| Padilla & Associates - Los Angeles 5675 East Telegraph Rd., Suite A-260 Los Angeles, CA 90040 Telephone: (323) 728-8847 FAX No.: (323) 728-8867 | See the Department's DBE database at: http://www.dot.ca.gov/hq/bep/ |

In the Special Provisions, Section 2-1.04, "PRE-AWARD INFORMATION/QUESTIONNAIRE," the third paragraph is revised as follows:

"Along with the PAIQ, the bidder shall submit with the bid the Proposal Drawing submittal as described in "Contractor Design" of these special provisions."

In the Special Provisions, Section 2-1.06, "BIDDER COMPENSATION," the first paragraph is revised as follows:

"The Department recognizes the costs required to prepare bids for a project of this magnitude. To encourage competitive bids, within 90 days of award of the contract, the second and third low bidders shall each receive \$200,000 to defray a portion of the costs of providing a responsive bid."

In the Special Provisions, Section 2-1.06, "BIDDER COMPENSATION," the second paragraph is deleted.

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In the Special Provisions, Section 2-1.07, "SUBMITTAL OF PROPOSAL DRAWINGS AND SUBMITTAL SCHEDULE" is replaced with Section 2-1.07, "SUBMITTAL OF PROPOSAL DRAWINGS," as follows:

"2-1.07 SUBMITTAL OF PROPOSAL DRAWINGS"

Attention is directed to "Contractor Design" of these special provisions regarding proposal drawings which shall be submitted with the bid. It is understood that the proposal drawings at bid time are preliminary conceptual versions subject to change, however, the drawings shall be as complete and comprehensive as possible to demonstrate a clear plan for construction. Review of the proposal drawings will be to assess the responsibility of the Contractor, and does not relieve the Contractor from conforming to plans and specifications.

The contract provisions in this section shall be considered part of the cost of preparing bids and no separate payment will be made therefor."

In the Special Provisions, Section 3-1.01A, "PRE-AWARD MEETING," is revised as attached.

In the Special Provisions, Section 5-1.14, "CONTRACTOR DESIGN," is revised as attached.

In the Special Provisions, Section 5-1.18, "AREAS FOR CONTRACTOR'S USE," in the third paragraph items 1, 2, and 3 are revised as follows:

1. **"Area GR:** It is designated for use by Contract 04-0120G4 and will not be available to the Contractor until July 1, 2004.
2. **Area QR:** It is designated for use by Contract 04-0120Q4 and will not be available to the Contractor until January 10, 2004.
3. **Area XQR:** It is available to both Contract 04-0120Q4 and this contract until January 9, 2004 and then to this contract after that date. Prior to January 9, 2004, the Contractor shall coordinate any planned work in "Area XQR" with the Engineer and Contractor of Contract 04-0120Q4."

In the Special Provisions, Section 10-1.15, "TEMPORARY BYPASS STRUCTURE," is revised as attached.

In the Special Provisions, Section 10-1.155, "SOUTH EDGE GIRDER SUPPORT," is added as attached.

In the Special Provisions, Section 10-1.16, "TEMPORARY SUPPORTS," subsection "TEMPORARY SUPPORT DESIGN CRITERIA," the following sentence is added to the end of the first paragraph:

"The design of the temporary structure designated on the plans as Support Structure (Location B) shall include loading from the South Edge Girder Support."

In the Special Provisions, Section 10-1.29, "MAINTAINING TRAFFIC," the following paragraph is added after the fourteenth paragraph:

"After completion of the 04-0120R4 Contract, the Contractor shall provide a minimum 6.0 m wide construction access road along Southgate Road with 3.7 m minimum vertical clearance under TBS as directed by the Engineer."

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In the Special Provisions, Section 10-1.29, "MAINTAINING TRAFFIC," the fifteenth paragraph is revised as follows:

"Full compensation for providing the above access along Southgate Road and the access road to the sanitary sewer lift pump station shall be considered as included in the contract price paid for various items of work involved and no additional compensation will be allowed therefor."

In the Special Provisions, Section 10-1.30, "CLOSURE REQUIREMENTS AND CONDITIONS," subsection "CLOSURE SCHEDULE," the following paragraph is added after the second paragraph:

"The schedule for the 24-hour bridge closure shall include the Engineer's inspection of the structures before the lanes are opened for traffic. Such inspection includes, but shall not be limited to, reviews by maintenance, traffic and safety personnel of the Department."

In the Special Provisions, Section 10-1.38, "EXISTING HIGHWAY FACILITIES," the following paragraphs are added after the first paragraph:

"Except as otherwise provided for damaged materials in Section 15-2.04, "Salvage," of the Standard Specifications, the materials to be salvaged shall remain the property of the State, and shall be cleaned, packaged, bundled, tagged, and hauled to the East Bay Maintenance Yard and stockpiled. The East Bay Maintenance Yard is located at 210 Burma Road, Oakland, CA 94608.

Material to be salvaged shall be as directed by the Engineer and is expected to include truss webs of the existing bridge, mobile ladders, and travelers with all motors, trolleys, nets, and appurtenances.

The Contractor shall notify the Engineer 48 hours prior to hauling salvaged material to the East Bay Maintenance Yard.

Salvage of material as directed by the Engineer shall be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications."

In the Special Provisions, Section 10-1.38, "EXISTING HIGHWAY FACILITIES," subsection "COLD PLANE ASPHALT CONCRETE PAVEMENT," the last sentence of the fourth paragraph is revised as follows:

"Planing asphalt concrete pavement operations shall be performed without damage to the surfacing to remain in place including existing bridge decks."

In the Special Provisions, Section 10-1.38, "EXISTING HIGHWAY FACILITIES," subsection "BRIDGE REMOVAL," subsection "1. BRIDGE REMOVAL PORTION," the second paragraph is revised as follows:

"This work consists of removing portions of the existing Route 80 concrete viaduct, including retaining walls and bridge mounted electroliers, from Bent 39 to Bent 48 to the limits shown on the plans. Retaining wall removal is designated on the plans as retaining wall removal (portion) location A, and retaining wall removal (portion) location B."

In the Special Provisions, Section 10-1.52, "RUBBERIZED ASPHALT CONCRETE (TYPE O)," is deleted.

In the Special Provisions, Section 10-1.521, "OPEN GRADED ASPHALT CONCRETE," is added as attached.

In the Special Provisions, Section 10-1.522, "EPOXY ASPHALT CONCRETE SURFACE," is added as attached.

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In the Special Provisions, Section 10-1.66, "DRAINAGE FACILITIES," is added as attached.

In the Special Provisions, Section 10-3.01, "DESCRIPTION," subsection "ELECTRICAL WORK (STAGE 2)," the following items are added as follows:

- "24. Remove all existing conduit and splice boxes on the North side of the longitudinal girder as shown on the plan.
- 25. Replace existing call boxes with new State furnished wireless solar powered call boxes.
- 26. Install new splice boxes, rigid steel galvanized conduit and liquid tight flexible conduit as shown on the plans.
- 27. Perform cable continuity and insulation tests.
- 28. Conduct functional test on call boxes and lighting circuits."

In the Proposal and Contract, the Engineer's Estimate Items 86 and 87 are revised, Items 89, 90, 91, and 92 are added and Items 62 and 88 are deleted as attached.

To Proposal and Contract book holders:

Replace pages 6 and 7 of the Engineer's Estimate in the Proposal with the attached revised pages 6 and 7 of the Engineer's Estimate. The revised Engineer's Estimate is to be used in the bid.

Indicate receipt of this addendum by filling in the number of this addendum in the space provided on the signature page of the proposal.

Submit bids in the Proposal and Contract book you now possess. Holders who have already mailed their book will be contacted to arrange for the return of their book.

Inform subcontractors and suppliers as necessary.

This office is sending this addendum by UPS overnight mail to Proposal and Contract book holders to ensure that each receives it. A copy of this addendum and the modified wage rates are available for the contractor's use on the Internet Site:

http://www.dot.ca.gov/hq/esc/oe/weekly_ads/addendum_page.html

If you are not a Proposal and Contract book holder, but request a book to bid on this project, you must comply with the requirements of this letter before submitting your bid.

Sincerely,

ORIGINAL SIGNED BY:

REBECCA D. HARNAGEL, Chief
Office of Plans, Specifications & Estimates
Office Engineer

Attachments

3-1.01A PRE-AWARD MEETING

The Engineer will review the responses to the "Pre-Award Information/Questionnaire" (PAIQ) and the Proposal Drawings submitted by the apparent low bidder. If the Engineer determines it necessary, a pre-award qualifications review meeting will be conducted. The meeting, if held, will be on **October 23, 2003 at 1:00 p.m. in the third floor conference room, 1727 - 30th Street, Sacramento, CA 95816**. The apparent low bidder shall participate in the Pre-award Meeting conducted by one or more agents of the Director and the Engineer. Non-attendance to the qualification review meeting by the apparent low bidder shall be just cause for rejection of the bid and forfeiture of the proposal guaranty.

At the Pre-award Meeting, the prospective bidder shall be prepared to discuss and answer questions relative to the responses to PAIQ and the concept drawing design submittal submitted with the bid. Based on the bidder's experience and safety history, conceptual approach to the design, construction, and removal work, logistics, and schedule as presented in the PAIQ, the Proposal Drawings, and on any information provided at the Pre-Award Meeting, the Department will make a determination on the bidder's qualifications for performing the work in a manner that is safe for the workers and the public.

Experience in design and construction of bridges is highly desirable and will be an important factor in determining the Contractor's qualifications to perform the project. It is highly recommended that the Contractor's authorized representative has experience with the responsibilities designated in Section 5-1.06, "Superintendence," of the Standard Specifications. Such experience in construction work of the bridge design type selected by the Contractor is highly desirable and will also be an important factor in determining the Contractor's qualifications to perform the project.

The experience and qualifications of the Contractor's authorized representative, whether originally designated or as replaced by a subsequent designee during performance of the contract, will be subject to review by the Department in conformance with the provisions as specified in "Pre-Award Information/Questionnaire," of these special provisions. Upon request by the Engineer, the Contractor shall provide the same information regarding any subsequent authorized representative as required to be provided for the original authorized representative as set forth in the PAIQ in the Proposal.

Successful completion of the pre-award qualifications process does not relieve the Contractor of the responsibility for furnishing materials or producing finished work of the quality specified in project plans and specifications, including the project plans and specifications authorized by the Engineer.

The second and third apparent low bidders shall participate in the Pre-award Meeting if requested to do so by the Department. Notification by the Department will be within 7 days after the bid opening, and will be provided at least 48 hours prior to the qualifications review meeting. Non-attendance by the second or third apparent low bidder at any such requested meeting shall be just cause for rejection of bid and forfeiture of the proposal guaranty.

5-1.14 CONTRACTOR DESIGN

This work shall consist of designing and providing detailed design plans, supplemental technical special provisions and quantities of various items of work for the construction of the Temporary Bypass Structure, including all appurtenances required for bridge mounted utilities, deck drainage system, and signs, at locations shown on the plans and as specified in "Temporary Bypass Structure," elsewhere in these special provisions, and in these special provisions.

The Temporary Bypass Structure shall be designed in accordance with the design criteria as shown on the plans, and as specified in these special provisions. Engineering design and calculations, and independent design check calculations shall be submitted to the Engineer for review and acceptance.

Detailed design plans, supplemental technical special provisions and associated quantities of items of work shall be submitted to the Engineer for acceptance and authorization for construction.

Engineering design and calculations for the Temporary Bypass Structure and all associated detailed design plans, supplemental technical special provisions and quantities of items of work shall be signed by an Engineer who is registered as a Civil Engineer in the State of California.

Independent design check calculations for the Temporary Bypass Structure and all associated detailed design plans and quantities of items of work shall be signed by another Engineer who is registered as a Civil Engineer in the State of California.

Two of the Contractor's representative shall be designated as "Design Manager" and "Contractor's Engineer." Design Manager and Contractor's Engineer shall conform to the following:

Design Manager

The Design Manager shall be an engineer who is registered as a Civil Engineer in the State of California, and shall have a minimum of ten years of experience in designing bridges of the type proposed by the Contractor and have managed at least one design project comparable in size, difficulty and cost. Proof of the registration and the required experience shall be submitted by the Contractor within 5 days after receiving notice that the contract has been approved .

The Design Manager shall:

1. Be responsible for the Contractor's design quality control and quality assurance (QC/QA) plan and the quality of the Contractor designs,
2. Verify design compliance with the requirements of the plans and these special provisions,
3. Coordinate the design submittal schedule with the Engineer,
4. Coordinate the Contractor responses to design comments issued by the Engineer, and
5. Ensure that design documents and records are kept in compliance with the requirements of these special provisions.

Contractor's Engineer

The Contractor's Engineer, who is registered as a Civil Engineer in the State of California, shall be the engineer of record who will be responsible for producing, stamping and signing all of the Engineering design calculations for the Temporary Bypass Structure (TBS) and all associated detailed design plans, supplemental technical special provisions and quantities of items of work.

The Contractor's Engineer shall certify in writing that the TBS is constructed in conformance with the authorized detailed design plans and supplemental technical special provisions.

PROPOSAL DRAWING SUBMITTAL

The Contractor shall prepare and submit proposal drawings in accordance with the requirements of these special provisions. Proposal drawings are drawings which shall be submitted by all bidders with the bid. Ten sets shall be submitted. Proposal drawings shall:

1. Contain a drawing index with drawing numbers and drawing titles
2. Be in metric units

3. Comply with the following manuals of the Department:
 - a. Plans Preparation Manual
 - b. Bridge Design Aids Manual
 - c. Bridge Design Details Manual
 - d. Bridge Memo to Designers Manual
 - e. Information and Procedures Guide of the Office of Special Funded Projects
4. Be of sufficient detail to depict the TBS segments, elements, and components, as defined in "Temporary Bypass Structure," elsewhere in these special provisions, in plan and elevation, and show at the minimum:
 - a. Bridge geometry
 - b. Each bent in section labeled with a station
 - c. The obstruction free clearance at the point of minimum vertical clearance, and traffic opening width
 - d. Each foundation location and type labeled with station
 - e. Locations and types of joints, both expansion and construction
 - f. Locations and types of bearings
 - g. The arrangement and material type and size of each structural member to demonstrate load paths from the superstructure to the ground through the substructure and foundation
 - h. Locations and type of components to be designed for ductile behavior
 - i. Locations and type of components to be capacity protected
 - j. Fundamental periods of vibration for each segment
5. Include a Type Selection Memo by segment in conformance with the requirements in Chapter 1-29 of the Bridge Memo to Designers Manual
6. Include a structure construction sequencing plan

DESIGN QC/QA PLAN

The Contractor shall prepare and submit a design QC/QA plan in accordance with the requirements of these special provisions. The design QC/QA plan shall address, as a minimum, the items described in "Quality Control" in these special provisions.

The design QC/QA plan shall include the following:

- A. Method to be employed by the Contractor to track design tasks, design submittals, approvals, and re-submittals.
- B. Reference section of the Standard Specifications, these special provisions, design criteria, or other design document required or referenced in the production of each design submittal.
- C. A time-scaled logic diagram which shows the schedule of all design activities and associated design submittals, and demonstrates any interdependency between separate submittals.
- D. Allowable time for review of the submittal by the Engineer as specified in the Standard Specifications and these special provisions.
- E. In the event that several related submittals with review times on the controlling/critical path are submitted simultaneously, or an additional submittal is submitted for review before the review of a previous submittal has been completed, the Contractor shall designate the sequence in which the submittals are to be reviewed.
- F. Identification of the first occurrence of any controlling/critical path operation affected by each submittal and a contingency plan describing how the designer will address any required redesign of any submittals previously authorized for construction.

Within 5 days after receiving notice that the contract has been approved, as specified in Section 8-1.03, "Beginning of Work," of the Standard Specifications, the Contractor shall submit to the Engineer, for review and approval, the design QC/QA plan in conjunction with the Baseline Schedule. The Engineer shall be allowed 10 days to review the QC/QA plan and to provide comments. All comments are to be implemented into the QC/QA plan. Re-submittal of the QC/QA plan is not required. No contract payments shall be made to the Contractor until a QC/QA plan is submitted in accordance with the above requirements. Attention is directed to the "Progress Schedule (Critical Path Method)" elsewhere in these special provisions for the definitions of Baseline Schedule and Controlling Operation.

DESIGN

Attention is directed to "Project Information," of these special provisions regarding the materials information handout for foundation and design information.

Designing the TBS and the preparation of detailed design plans, production of supplemental technical special provisions, and quantities calculations shall be in conformance with these special provisions and the following:

1. Plans Preparation Manual of the Department
2. Bridge Design Aids Manual of the Department
3. Bridge Design Details Manual of the Department
4. Bridge Memo to Designers Manual of the Department
5. Plans, Specifications and Estimates Guide of the Department
6. Information and Procedures Guide of the Office of Special Funded Projects of the Department
7. Current Electrical and Mechanical codes
8. Current 1999 Standard Special Provisions and Bridge Reference Specifications of the Department
9. July 1999 Standard Specifications of the Department
10. July 1999 Standard Plans of the Department
11. Policy on High and Low Risk Underground Facilities within Highway Rights of Way of the Department

The approach slab, where shown on the plans, shall be included in the Contractor's design of the TBS.

It is expected that temporary excavation shoring will be required to support existing facilities, foundations, and embankments during the various stages of construction. Unless specified otherwise, temporary excavation shoring shall conform to the requirements of Sections 7-1.09, "Public Safety," and 19-1.02, "Preservation of Property," of the Standard Specifications.

The Contractor shall prepare working drawings detailing the temporary excavation shoring in accordance with Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. All working drawings for temporary excavation shoring shall be signed by an engineer who is registered as a Civil Engineer in the State of California. The temporary excavation shoring shall be approved by the Engineer prior to construction.

Temporary shoring of the types designated as Important Construction in the design criteria shown on the plans, shall be designed to conform to the requirements of said design criteria. Design submittals for such temporary shoring shall conform to the requirements in these special provisions.

Full compensation for furnishing, installing and removing temporary excavation shoring shall be considered as included in the contract prices paid for the various items of earthwork involved and no additional compensation will be allowed therefor.

Expansion joints connecting TBS superstructure segments shall be included in the Contractor's design of the west tie-in superstructure or east tie-in superstructure. Expansion joints shall be modular type. Modular expansion joints having designs where movable components are metal on metal will not be permitted.

Where steel forms are proposed for concrete deck construction for the Viaduct segment, the design shall either accommodate removal of steel forms after completion of the deck, or provide for application of an acoustic insulating material to the underside of the deck that is approved by the Engineer.

All permanent supporting elements of the TBS shall be designed to conform to the Department's standards for a permanent highway structure and these special provisions. Permanent supporting elements of the TBS shall not contain structural components that are traditionally acceptable for the construction of temporary structures used to facilitate construction, such as falsework or temporary supports. Structural elements such as timber foundations, timber posts and beams, timber bracing, cables, and the like will not be permitted as part of the permanent supporting elements of the TBS.

Geotechnical Investigation

The foundation design shall conform to the design criteria as shown on the plans, and as supplemented by the following foundation information provided in the information handout:

1. "Geotechnical Foundation Report for YBI Approach and Self-Anchored Suspension Bridge," June 2002 by Fugro-Earth Mechanics, Joint Venture
2. "Final Yerba Buena Island Geotechnical Site Characterization Report, San Francisco Oakland Bay Bridge East Span Seismic Safety Project," December 2001 by Fugro-Earth Mechanics, Joint Venture
3. "Additional Information for Pile Foundations Yerba Buena Island Temporary Bypass Structure (TBS) Design-Build SFOBB East Span Seismic Safety Project," July 18, 2003, by Fugro-Earth Mechanics, Joint Venture

The available foundation information is not considered to be sufficient to facilitate the design of all required TBS foundations. At the Contractor's expense, the Contractor shall conduct additional foundation investigations to facilitate the design of all TBS foundations in areas where the foundation information is insufficient. Such investigations shall conform to the provisions in Section 49-1.03, "Determination of Length," of the Standard Specifications.

The Contractor shall prepare and submit a Foundation Report for all proposed TBS foundation designs, regardless of whether they are based on the information contained in the information handout or result from investigations conducted by the Contractor. The Foundation Report shall be prepared in conformance with the requirements in the Information and Procedures Guide of the Office of Special Funded Projects of the Department and shall be signed by an engineer who is registered as a Geotechnical Engineer in the State of California. This same engineer shall certify in writing that the TBS foundations are constructed in conformance with the Foundation Report. For foundation designs based on the information contained in the information handout, the Foundation Report shall be a certification by the Contractor's registered Geotechnical Engineer, that the information is adequate for the design, and no further investigation is required.

The Viaduct and West Tie-In segments of the TBS shall not be designed with permanent supports that are required to be founded on the restricted slope area designated on the plans. Due to the steep gradients of the restricted slope area, only geological site reconnaissance has been conducted. The available foundation information provides some information on the soil and rock conditions and groundwater levels interpolated from areas surrounding the slopes. Geotechnical investigation information adequate for foundation design on the restricted slope area is not available. If the Contractor decides to place any foundations to facilitate construction of the TBS on the restricted slope area, the Contractor's Geotechnical Engineer shall conduct geotechnical site investigations to verify local soil and groundwater conditions in this area, and to obtain necessary input parameters for design for the foundations and evaluation of slope stability. The geotechnical site investigations shall conform to these special provisions.

The Contractor's Geotechnical Engineer shall develop foundation designs and measures against potential slope failure initiated by external loading from these foundations. The Contractor shall submit to the Engineer for approval a design report addressing slope stability. This report shall include, but not be limited to, the method of analysis with narrative, input parameters used, design calculations, results and conclusions. For the design procedures and requirements for the slope stability evaluation, consult the following reference:

1. Caltrans 2002, Guideline for Foundation Investigations and Reports (Caltrans 2000 Guidelines) - (Version 1.2, June 2002)
(<http://www.dot.ca.gov/hq/esc/geotech/request.htm#fg>)

Slope stability shall be checked against a static factor of safety of 1.3 for all stages of construction.

The use of spread footings on the slope will require prior stabilization of the upper 2 meters of existing surface soils. Spread footings shall have a horizontal setback of 1.2 meters from the slope face. Any slope modification requires prior slope preparation and installation of a protective catchment system to maintain full-time access to the existing USCG facilities. The protective catchment system shall be submitted to the Engineer for approval. All earthwork shall conform with the requirements in Section 19, "Earthwork," of the Standard Specifications.

The slope shall be monitored during construction of the TBS to check for any slope displacement within 200 meters of either side of the TBS. The Contractor shall perform an initial topographic survey as part of the displacement monitoring system to record the location of the existing slope prior to the commencement of any work. Two copies of the survey shall be signed by an engineer, who is registered as a Civil Engineer in the State of California, and submitted to the Engineer.

Vandal-resistant displacement monitoring equipment shall be provided and maintained. Vertical and horizontal displacements of the slope shall be monitored continuously and shall be accurately measured and recorded at least weekly during construction of the TBS. The records of vertical and horizontal displacement shall be signed by an engineer who is registered as a Civil Engineer in the State of California.

After completion of construction of the TBS, all foundations constructed to facilitate construction of the TBS on the restricted slope area, shall be removed as follows:

1. At the locations of future permanent foundations, where shown on the plans, foundations shall be completely removed.
2. At all other locations, foundations shall be removed 0.3 meter below existing ground or 1 meter below the finished grade, whichever is lower.

After removal of any foundations placed on the slope to facilitate construction of the TBS, all modified slopes, within 200 meters to either side of the TBS, including excavations required to remove foundation components, shall be restored to a condition that is stable under both static and future earthquake loading. The finished slope shall be designed for a static factor of safety of 1.3 and a pseudo-static factor safety of 1.1, as specified in Caltrans 2002 Guidelines. For the pseudo-static analysis, a seismic coefficient equal to 1/3 of the peak ground acceleration shown on the design criteria may be used, but the peak ground acceleration shall not be greater than 0.2g, as specified in Caltrans 2002 Guidelines.

The final slope shall include protective measures for surficial ground stability and erosion control. Such measures shall conform to the various Erosion Control requirements specified elsewhere in these special provisions, and shall be submitted to the Engineer for approval.

DESIGN SUBMITTALS

The Contractor shall prepare and submit the following Design Submittals to the Engineer for acceptance and authorization of construction:

Preliminary Design Submittal
Final Design Submittal
Construction Submittal

The term "acceptance" shall mean that the design submittal has been received, that it includes all of the required contents defined in these special provisions for the particular design submittal, and that there is sufficient information, as determined by the Engineer, to properly evaluate the submittal.

The term "authorized for construction" shall mean that the design submittal includes all of the required contents defined in these special provisions for the particular design submittal, including clearly meeting the constraints of the design criteria shown on the plans, satisfactorily addresses design review comments provided by the Engineer, and that there is sufficient information, as determined by the Engineer, to inspect resulting fabrication and construction.

Design submittals shall be submitted as specified under the heading "Design Submittal Review" of these special provisions. The contents of each Design Submittal shall be of sufficient detail to depict the TBS segments, elements, and components, as defined in "Temporary Bypass Structure," elsewhere in these special provisions, and shall conform to the following:

Preliminary Design Submittal

Preliminary design submittal shall consist of the following:

1. Preliminary design information package
2. Detailed preliminary design drawings
3. Draft supplemental technical special provisions

Preliminary design information package shall, as a minimum, include the following:

1. A statement describing any modifications to or deviations from the information submitted with the proposal drawing submittal
2. Expected expansion joint movements
3. Preliminary loading and linear elastic response spectra force and displacement results (i.e. axial, moment, shear) on all primary components due to design loads conforming to the design criteria shown on the plans
4. Preliminary Inelastic static pushover results showing deformation capacity of all ductile primary members at the displacement limit state (DLS) displacements
5. Preliminary Foundation Report, submitted with foundation elements only

The Contractor shall also furnish additional information as requested by the Engineer to facilitate review of the preliminary design information package.

Detailed preliminary design drawings shall, as a minimum, include the following:

- General Plans
- Structure Plans
- Abutment cross-sections
- Foundation Plans
- Pier (i.e. tower/bent/column) cross-sections
- Foundation Detail Plans
- Typical Sections
- Girder layouts or framing plans
- Expansion joint details
- Bearing details
- Structural joint and connection details

Detailed preliminary design drawings shall:

1. Contain a drawing index with drawing numbers and drawing titles
2. Be in metric units
3. Comply with the following manuals of the Department:
 - a. Plans Preparation Manual
 - b. Bridge Design Aids Manual
 - c. Bridge Design Details Manual
 - d. Bridge Memo to Designers Manual
 - e. Information and Procedures Guide of the Office of Special Funded Projects

4. Be clearly marked "NOT FOR CONSTRUCTION"
5. Show the arrangement and material type and size of each structural member to demonstrate load paths from the superstructure to the ground through the substructure and foundation.
6. Be of sufficient detail to (a) define the TBS elements in plan and elevation, including deck drainage and overhead and bridge mounted signs, (b) define the mounting details for electrical and mechanical systems (c) demonstrate conformance to the requirements of the contract documents.
7. Contain preliminary utility relocation plans identifying relocation of impacted utilities within boundary of the construction based on new potholing performed by the Contractor. Contractor may require additional potholing to verify impacted utilities as approved by the Engineer.

Draft supplemental technical special provisions shall be prepared as specified under the heading "Supplemental Technical Special Provisions" of these special provisions.

Final Design Submittal

Final design submittal shall consist of the following:

1. Final design information package
2. Final detailed construction drawings
3. Final TBS design and independent check calculations
4. Final Foundation Report
5. Final quantity calculations
6. Final supplemental technical special provisions

Final design information package shall, as a minimum, include the following:

1. A statement describing any modifications to or deviations from the information submitted with the preliminary design submittal, including a detailed description of resolution of reviewer comments
2. Any revised document that has changed since the preliminary design submittal
3. Structure construction sequencing plan
4. Resident Engineer's (RE) Pending File contents as specified in the Information and Procedures Guide of the Office of Special Funded Projects of the Department

The Contractor shall also furnish additional information as requested by the Engineer to facilitate review of the final design information package.

Final detailed construction drawings shall conform to the requirements specified above for preliminary design drawings, with the following minimum additional requirements:

1. Bear the stamp, signature, and license expiration date of the Contractor's Engineer or designee, who is responsible for developing the drawing
2. Contain final utility relocation plans identifying relocation of impacted utility within boundary of the construction based on new potholing performed by the Contractor. Contractor may require additional potholing to verify impacted utilities as approved by the Engineer.

Final TBS design and independent check calculations shall be prepared as specified under the heading "TBS Design Calculations" of these special provisions.

Final quantity calculations shall be prepared as specified under the heading "Quantity Calculations" of these special provisions.

Final supplemental technical special provisions shall be prepared as specified under the heading "Supplemental Technical Special Provisions" of these special provisions.

Construction Submittal

The construction submittal shall contain the following:

1. Construction information package
2. Revised final detailed construction drawings
3. Revised final TBS design and independent check calculations
4. Revised quantity calculations
5. Revised final supplemental technical special provisions

The construction information package shall, as a minimum, include the following:

1. A statement describing any modifications to or deviations from the information submitted with the final design submittal, including a detailed description of resolution of reviewer comments
2. Any revised document that has changed since the final design submittal

The Contractor shall also furnish additional information as requested by the Engineer to facilitate review of the construction information package.

Revised final detailed construction drawings shall conform to the requirements specified above for final design drawings.

Revised final TBS design and independent check calculations shall be prepared as specified under the heading "TBS Design Calculations" of these special provisions.

Revised quantity calculations shall be prepared as specified under the heading "Quantity Calculations" of these special provisions.

Revised final supplemental technical special provisions shall be prepared as specified under the heading "Supplemental Technical Special Provisions" of these special provisions.

The construction submittal, consisting of final detailed design drawings and supplemental technical special provisions, in conjunction with the standard specifications and these special provisions, shall be of sufficient detail to (a) construct the TBS, including deck drainage and overhead and bridge mounted signs, (b) install the electrical and mechanical systems, and (c) demonstrate conformance to the requirements of the Contract documents.

TBS Design Calculations

TBS design calculations shall include both design and independent check calculations. TBS design calculations shall be submitted to the Engineer. Calculations shall include all analysis and computations necessary to design and check the TBS, including layout, structural elements, and operational features (such as deck drainage and overhead and bridge mounted signs and mounting details for electrical and mechanical systems). Design calculations shall be submitted by segment of the TBS.

1. Design calculations shall:
 - a. Be bound separately for each segment
 - b. Bear the stamp, signature, and license expiration date of the Contractor's Engineer or designee, who is responsible for developing the calculations
 - c. Be clearly labeled as design or check calculations, indicating the contract number and title, and description of the calculations
 - d. Contain a table of contents with page numbers; all calculation pages shall be numbered
 - e. Be decipherable and organized so that the design logic can be easily followed
 - f. Contain documentation of assumptions, conclusions, references and design logic
 - g. Contain copies of design charts, with specific entries highlighted that were used in the design
 - h. Contain only final input and output of computer runs
 - i. Contain hand calculations, or computer-generated calculations.

2. Independent Check Calculations: Independent check calculations shall be prepared by the Contractor using a qualified individual who has not been involved with the design of the TBS. Independent check calculations shall bear the State of California Registered Professional Engineer Registration seal with signature, license number and certificate expiration date of the design engineer who is responsible for the independent check. The independent check shall include all analysis and computations necessary to independently check all aspects of the design of the TBS structural elements, and shall be prepared in the same manner as specified for design calculations. The independent checker shall not review the design calculations prior to preparing the independent check calculations. Independent check calculations shall be submitted with the design calculations by segment and element of the TBS.

Quantity Calculations

Quantity calculations and quantity check calculations shall be prepared, compared and resolved, and submitted in accordance with the requirements of Chapter 11 of Bridge Design Aids Manual and the Plans, Specifications and Estimates Guide of the Department and the Department's current standards for quantity calculations and quantity check calculations for electrical and mechanical systems.

Supplemental Technical Special Provisions

Supplemental technical special provisions shall be prepared to complement these special provisions, and shall bear the State of California Registered Professional Engineer Registration seal, with signature, license number and certificate expiration date of the engineer who is responsible for developing the supplemental technical special provisions. Supplemental technical special provisions shall be prepared by using and editing the most current revisions of the Standard Special Provisions and Bridge Reference Specifications of the Department. The Standard Special Provisions are statewide, approved special provisions and are posted at the Division of Office Engineer website (http://www.dot.ca.gov/hq/esc/oe/specs_html/index.html). The Bridge Reference Specifications are statewide special provisions used for special bridge applications, and are posted at the Structure Office Engineer website (<http://www.dot.ca.gov/hq/esc/structurespecs/>). The Standard Special Provisions and Bridge Reference Specifications will hereinafter be referred to as "SSPs."

All standard and non-standard items of work to be used in the construction of the TBS shall be addressed by the supplemental technical special provisions, regardless of how those items of work are being paid. Even in circumstances where the work is addressed by the Standard Specifications, the items of work shall be addressed in the supplemental technical special provisions by including a reference to the applicable Standard Specification.

Editing of the SSPs shall conform to the requirements in the Plans, Specifications and Estimates Guide of the Department and these special provisions. This includes preparing the supplemental technical special provisions in the version of Microsoft Word currently used by the Division of Office Engineer. When editing the SSPs, deviation from the instructions contained within the SSPs, including the deletion of text, will not be permitted without prior written approval by the Engineer. The Contractor shall obtain prior written approval from the Engineer to modify existing SSPs beyond that allowed in the instructions. Deletion of references to payment clauses for items of work is permitted and expected. The Contractor shall obtain prior written approval from the Engineer to add technical special provisions that originate from a source other than the SSPs.

Department SSPs shall not be edited to change plural to singular or singular to plural or to rewrite text in an attempt to improve it.

Supplemental technical special provisions shall not include provisions that are of an administrative nature or any language attempting to alter the terms of the Contract. Any such language will be rejected.

Supplemental technical special provisions shall be organized as follows:

1. Section 8, "Materials" – This section shall contain all materials specifications and all amendments to materials specifications as provided in the special provisions included for the prospective items of work.
2. Section 10, "Construction Details" - This section shall contain all remaining supplemental technical special provisions for various items of work used in the construction of the TBS.

All conflicts between the supplemental technical special provisions for the TBS and roadway portions of the work shall be resolved by the Contractor before submitting the supplemental technical special provisions to the Engineer for review.

The Engineer will return the supplemental technical special provisions to the Contractor for correction if they do not conform to the requirements in these special provisions.

QUALITY CONTROL

The Contractor shall prepare and submit preliminary design, final design, and construction submittals in accordance with the Contractor's approved design QC/QA plan. The Contractor shall maintain evidence of quality control measures taken during preparation of design submittals. Evidence of quality control measures taken shall be in the form of (a) final marked-up documents and (b) annotated checklists prepared by an individual who has reviewed the documents for conformance to the requirements of the contract documents. Annotated checklists shall depict the design procedures and submittal preparation requirements as found in the manuals and documents referenced in this section of these special provisions, and other specific design requirements listed in these special provisions.

Each design drawing and supplemental technical special provision shall have a check print, representing the final content of the design drawing or supplemental technical special provision. The designer and independent checker shall review the drawing or supplemental technical special provision for (a) conformance to the requirements of the contract documents, (b) incorporation or resolution of marked-up comments, and (c) compatibility with all related design elements. As evidence of their review, the designer and independent checker shall sign and date the check print.

Prior to submittal, the Contractor, using a qualified individual, shall review the design submittal, using annotated checklists, to verify conformance to the requirements of the contract documents.

The annotated checklists shall include, as a minimum, confirmation of the following:

1. The design submittals have been prepared in conformance with the requirements of these special provisions
2. The TBS design, including overhead and bridge mounted signs, conforms to the structural design criteria as shown on the contract plans
3. The design of mounting details for electrical and mechanical systems conforms to the design criteria as shown on the contract plans
4. The TBS design is constructable
5. The electrical and mechanical system design is installable
6. Layout is in compliance with the requirements of the plans and specifications
7. The TBS required construction work area is within the work limits shown on the contract plans
8. Utility conflicts have been identified and addressed in a manner that is consistent with Caltrans policy on high- and low-risk utilities. Utilities relocation by the Contractor are identified and timed to avoid construction conflicts.
9. Drainage has a clear path from source to outfall and storm water run-off pollution prevention is identified
10. Lighting is in compliance with the requirements of the plans and specifications. Lighting foundation have been included
11. Maintenance of the structures can be performed with existing Caltrans practices
12. Environmentally sensitive areas will not be affected by construction
13. Contractor work access is planned to remain within the limits allowed by the contract
14. The TBS and electrical system design has been coordinated with the interfaces shown on the contract plans
15. Schedule for completion and lane closures is obtainable
16. The Design uses materials that are commercially available to the Contractor by the time of construction

Any submission by the Contractor of designs, design plans, and supplemental technical special provisions prepared by the Contractor for Department review shall constitute an affirmation by the Contractor that the work detailed in the Contractor prepared design documents are complete, buildable by the Contractor, and comply with the design criteria shown on the plans and these special provisions and as directed by the Engineer.

DESIGN SUBMITTAL REVIEW

The Contractor shall submit the design submittals in accordance with these special provisions and as follows:

1. The preliminary design submittal shall be submitted to the Engineer by the Contractor after the approval of the design QC/QA plan. Preliminary design submittal shall be submitted to the Engineer by the Contractor by complete element of each segment of the TBS.
2. The final design submittal shall be submitted to the Engineer by the Contractor after the Department has accepted and reviewed the Contractor's preliminary design submittal. Final design submittal shall be submitted by complete element of each segment of the TBS.
3. The construction submittal shall be submitted to the Engineer by the Contractor after the Department has accepted and reviewed the Contractor's final design submittal, and authorized the Contractor to construct the elements depicted in the final design submittal. The construction submittal shall be submitted by each segment of the TBS.

The design submittals of the temporary structure bridge segments designated as Temporary Shoring and Support Structure (Locations A through D), shall only be submitted by complete segment, and not by element or component.

After authorization by the Engineer, the construction submittal shall become Contract plans and specifications for the TBS.

Design Review Process

Within five working days of the receipt of the submittal by the Engineer, the Engineer will notify the Contractor in writing if the submittal is determined to be complete or incomplete. If the submittal is determined to be complete, it will be "accepted" by the Engineer, the review period will begin on that day. If the submittal is determined to be incomplete, it will not be accepted and will be returned to the Contractor for resubmittal. Submittals that do not conform to all design quality control requirements of these special provisions will be determined to be incomplete and will not be accepted by the Engineer. No Department review time will be accrued toward the returned submittal. No compensation will be allowed for any costs incurred or for delay in completing the work resulting from submittals that are not accepted by the Engineer.

The Department will return written comments to the Contractor at the conclusion of the design review for each preliminary and final design submittal. The Contractor shall address all comments and modify designs as required by the comments in conformity with the plans, these special provisions, and as directed by the Engineer.

Once the Engineer has completed review of the final design submittal, and the review comments have been addressed by the Contractor to the satisfaction of the Engineer, the Contractor will be authorized to construct the elements depicted in the final design submittal. When the final design submittal is approved by the Contractor's Engineer, and authorized for construction by the Engineer, the Contractor shall prepare and submit the Construction Submittal.

Design Submittal Process

While the Contractor may submit design submittals for review in any order of segment and segment element, the design submittals will only be reviewed by the Department in the following priority order:

1. Preliminary design submittals for foundations of a structure segment will not be reviewed prior to receiving preliminary substructure and superstructure design submittals for the same structure segment.
2. Final design submittals for elements of a structure segment will not be reviewed until the Engineer has reviewed and provided comments on preliminary design submittals of the same segment.
3. Preliminary design submittals for the electrical or mechanical system on a structure segment will not be reviewed prior to reviewing preliminary superstructure design submittals for the same structure segment.
4. Final utility relocation plans will not be authorized by the Engineer unless approved by the utility owner.

Design submittals made by the Contractor that do not comply with the specified priority order, will not be considered as delaying the Contractor's controlling operation on the critical path.

The number of copies of the contents required for each design submittal shall be as follows:

| Contents | Number of Copies for Each Design Submittal | | |
|--|--|------------------------|------------------------|
| | Preliminary Design Submittal | Final Design Submittal | Construction Submittal |
| Design Information Package | 5 | 5 | 5 |
| Design Drawings (paper) | 10 | 10 | 10 |
| Design Drawings (electronic files) | 2 | 2 | 2 |
| Design Calculations | N/A | 5 | 5 |
| Check Calculations | N/A | 5 | 5 |
| Quantity Calculations | N/A | 3 | 3 |
| Foundation Report | N/A | 3 | 3 |
| Supplemental Technical Special Provisions (paper) | 10 | 10 | 10 |
| Supplemental Technical Special Provisions (electronic files) | 2 | 2 | 2 |

The time to be provided for the Engineer's review of the design submittals shall be as follows:

| Design Submittal | Review Time - Weeks |
|------------------------|---------------------|
| Preliminary Design | 2 |
| Final Design | 4 |
| Construction Submittal | 1 |

Should the Engineer fail to review the complete design submittal within the time specified, and the Contractor's controlling operation on the critical path is delayed (as determined by the Engineer) by the Engineer's failure to review within the time specified, an extension of time will be granted in conformance with the provisions in Section 8-1.07, "Liquidated Damages," of the Standard Specifications and in "Progress Schedule (Critical Path Method)," of these special provisions. Should the Engineer fail to review the complete design package submittal within the time specified, compensation, if any, will be made in accordance with Section 8-1.09, "Right of Way Delays," of the Standard Specifications, and "Time Related Overhead," of these special provisions.

Design submittals shall be submitted sufficiently in advance of the start of the affected work to allow time for review by the Engineer and correction by the Contractor of the submittal contents without delaying the work. The time shall be proportional to the complexity of the work, but in no case shall the time be less than the review time as specified for the type of design submittal as required elsewhere in these special provisions.

Should the Contractor submit several related submittals with review times on the controlling/critical path, or an additional submittal for review before the review of a previously submittal has been completed, the time to be provided for the review of any submittal in the sequence shall be not less than the review time specified for that submittal, plus 7 calendar days for each submittal of higher priority which is still under review.

DESIGN CHANGE CONTROL

If the Contractor's design changes at any time during the development of the designs or during the construction of the TBS, after receiving authorization for construction, the Contractor shall resubmit designs for review and authorization by the Engineer prior to commencement with the changed work. Changes to the structural system, including overhead and bridge mounted signs, shall have both preliminary designs and final designs resubmitted to the Engineer for authorization as described herein. Changes to the deck drainage and mounting of electrical or mechanical systems or to non-structural components of the TBS shall have only final designs resubmitted to the Engineer for authorization as described herein.

PAYMENT

Contractor design shall be paid for on the basis of lump sum.

The contract lump sum price paid for contractor design shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in preparing and submitting contractor design, including geotechnical investigations and slope monitoring, and all work to verify the locations of existing utilities within the boundary of the construction, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.15 TEMPORARY BYPASS STRUCTURE

Attention is directed to "Contractor Design," elsewhere in these special provisions regarding the design, acceptance, and authorization for construction by the Department of the temporary bypass structure.

This work shall consist of constructing the temporary bypass structure (TBS) complete in place, including all required bridge barrier railing, bridge paving, bridge mounted utilities and related utility relocations, deck drainage system, and signs, at the location shown on the plans and in accordance with the Contractor's design plans that are accepted and authorized for construction by the Department.

GENERAL

The TBS, is shown schematically on the plans with the required design criteria to enable the Contractor to develop the design. The TBS, as shown on the plans, is divided into the following structure segments:

1. West Tie-In,
2. Viaduct, and
3. East Tie-In

Additionally, for the purposes of design submittals, temporary structures designated as Important Construction in "Temporary Supports," elsewhere in these special provisions, shall be considered as bridge segments of the TBS. Submittals for temporary structures designated as Support Structure (Locations A through D) shall be made as one inclusive bridge segment.

Each bridge segment contains the following structure elements:

1. Foundation(s), defined as the structural elements that transfers load to the soil or foundation material. Foundation elements shall consist of components such as driven piles, tie-down anchors, and other like individual structural members or work below a pile cap or spread footing.
2. Substructure(s), defined as vertical structural elements between the foundation and superstructure elements. Substructure elements shall consist of components such as pile caps, abutments, columns, piers, drop bent caps, drilled shafts, cast-in-place piles, and other like individual structural members.
3. Superstructure, defined as the longitudinal and horizontal structural elements, and appurtenances shown on the plans, that are above the substructure. Superstructure elements shall consist of components such as beams, integral bent caps, girders, trusses, and other like individual structural members.

Unless otherwise authorized by the Department, the TBS shall be constructed in conformance with the construction sequence, also defined as steps, as shown on the plans.

The approach slab, where shown on the plans, shall be included in the Contractor's design of the TBS.

Expansion joints connecting TBS superstructure segments shall be included in the Contractor's design of the west tie-in superstructure or east tie-in superstructure. Expansion joints shall be modular type. Modular expansion joints having designs where movable components are metal on metal will not be permitted.

The Contractor shall furnish and install expansion joint closures for the existing west tie-in as shown on the plans. Expansion joint closures shall conform the details shown on the plans and as specified in these special provisions. All metal parts shall conform to the provisions in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications. Where shown on the plans, asphaltic plug joint components shall conform to the requirements for asphaltic plug joint seal contained in "South Edge Girder Support," elsewhere in these special provisions. Where shown on the plans, joint filler shall conform to the requirements in Section 51-1.12, "Expansion and Fixed Joints and Bearings," of the Standard Specifications.

In addition to deck drainage on the TBS, the Contractor's design of the TBS shall include provisions for drainage of the existing portions of the west tie-in.

Attention is directed to "Project Information," of these special provisions regarding the materials information handout for foundation and design information. Concrete piles shall not be permitted for the Viaduct and East Tie-In. Piles for the Viaduct and East Tie-In, with the exception of the abutment, shall be driven steel piles.

Attention is directed to the following sections of these special provisions regarding permit restrictions and regulations that may impact TBS design and construction:

- A. Relations with the U.S. Coast Guard
- B. Relations with the Regional Water Quality Control Board
- C. Relations with United States Fish and Game Service
- D. Maintaining Traffic
- E. Sound Control Requirements
- F. Obstructions

Attention is directed to Section 7-1.16, "Contractor's Responsibility for the Work and Materials," of the Standard Specifications. Ordering or fabricating materials prior to receiving construction authorization by the Department, will be at the Contractor's risk.

Prior to proceeding with each segment of TBS construction, the Contractor shall notify the Engineer of such operations and shall not begin such operations until the Engineer, or the Engineer's authorized representative, is at the work site to observe the operation. The presence of the Engineer, or the Engineer's authorized representative, shall not relieve the Contractor of the responsibility to pay for any work performed by the Contractor that does not comply with the design plans authorized by the Department.

The Contractor may proceed with TBS construction provided that the following requirements have been fulfilled:

- A. The Contractor shall not begin construction of components of foundation elements, or work below spread footings prior to the following:
 - 1. The Engineer's acceptance of the preliminary design submittals for the foundation, substructure, and superstructure elements of an entire segment.
- B. The Contractor shall not begin construction of components of substructure elements prior to the following:
 - 1. The Engineer's acceptance and review of the final design submittals for the foundation elements of an entire segment.
 - 2. The Engineer's acceptance the final design submittals for the substructure elements of an entire segment.
 - 3. The Engineer's acceptance of the preliminary design submittals for the superstructure elements of an entire segment.
- C. The Contractor shall not begin construction of components of superstructure elements prior to the following:
 - 1. The Engineer's acceptance and review of the final design submittals for the substructure elements of an entire segment.
 - 2. The Engineer's acceptance the final design submittals for the superstructure elements of an entire segment.

Public traffic will not be permitted on the TBS until superstructure final design submittals for all superstructure elements have been authorized for construction by the Department, and all construction submittals for the TBS have been received by the Engineer.

MEASUREMENT AND PAYMENT

Temporary Bypass Structure, East Tie-In will be paid by the lump sum to the limits shown on the contract plans and the Contractor's design plans that are authorized for construction by the Department.

Temporary Bypass Structure, Viaduct will be paid by the lump sum to the limits shown on the contract plans and the Contractor's design plans that are authorized for construction by the Department.

Temporary Bypass Structure, West Tie-in will be paid by the lump sum to the limits shown on the contract plans and the Contractor's design plans that are authorized for construction by the Department.

The contract lump sum price paid for each segment of the temporary bypass structure listed in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in constructing the temporary bypass structure, complete in place, as shown on the contract plans and the Contractor's design plans that are authorized for construction by the Department, and as specified in the standard specifications, the authorized supplemental technical special provisions, and these special provisions.

Full compensation for expansion joint closures shall be considered as included in the contract lump sum price paid for Temporary Bypass Structure, West Tie-in, and no separate payment will be made therefore.

10-1.155 SOUTH EDGE GIRDER SUPPORT

This work shall consist of constructing the south edge girder support at the West Tie-In complete in place, including asphaltic plug joint seals, as shown on the plans and in conformance with the Standard Specifications and these special provisions.

GENERAL

Attention is directed to "Contractor Design" and "Temporary Supports" of these special provisions. For the purpose of design of support structures, the south edge girder support is part of the support structure (Location B).

South edge girder support loads are based on the details shown on the plans. The Contractor shall design connections between the south edge girder support and support structure (Location B). The connection design loads shown on the plans shall be adjusted by the Contractor to account for any loads imposed by the Contractor's activities, the actual materials used in the south edge girder support, and for the Contractor's Design of support structure (Location B).

Attention is directed to "Welding" in Section 8, "Materials," of these special provisions.

SUBMITTALS

The Contractor shall submit complete working drawings for the south edge girder support to the following location:

California Department of Transportation
Office of the Resident Engineer, Contract 04-0120R4
280 Beale Street
San Francisco, CA 94105

Working drawings shall be in conformance with the provisions in "Working Drawings," of these special provisions. The working drawings shall show complete details of the connections between the south edge girder support and support structure (Location B), and the joint seal system, including all required materials and the method of installation to be followed. For initial review, 5 sets of drawings shall be submitted. The Contractor shall allow the Engineer 4 weeks to review the drawings after a complete set has been received. After review, between 6 and 12 sets, as requested by the Engineer, shall be submitted for final approval and use during construction. In the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any loss and extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Any revisions by the Contractor to the south edge girder support design shown on the plans shall be submitted as part of the design submittals for the support structure (Location B). Such submittals shall conform to the requirements in "Contractor Design" of these special provisions.

CONCRETE

Portland cement concrete shall conform to the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Shotcrete shall not be used as an alternative construction method for reinforced concrete members unless otherwise specified.

ELASTOMERIC BEARING PADS

Elastomeric bearing pads shall conform to the provisions in Section 51-1.12H, "Elastomeric Bearing Pads," of the Standard Specifications and these special provisions.

Where elastomeric bearing pads are to bear against the existing concrete structure the contact surface of the structure shall be smooth. The surface may be smoothed by either grinding or filling the surface with mortar as approved by the Engineer. Where mortar is used, it shall conform to Section 51-1.135 "Mortar", of the Standard Specifications.

DRILL AND BOND DOWELS

Drilling and bonding dowels shall conform to the details shown on the plans, the provisions in Section 83-2.02D(1), "General," of the Standard Specifications, and these special provisions.

Dowels shall conform to the provisions for bar reinforcement in Section 52, "Reinforcement" of the Standard Specifications.

If reinforcement is encountered during drilling before the specified depth is attained, the Engineer shall be notified. Unless the Engineer approves coring through the reinforcement, the hole will be rejected and a new hole, in which reinforcement is not encountered, shall be drilled adjacent to the rejected hole to the depth shown on the plans.

ASPHALTIC PLUG JOINT SEAL

Asphaltic joint plug seal shall consist of cleaning, and constructing binder and aggregate systems that seal the joints at the location shown on the plans, and shall conform to the details shown on the plans and these special provisions.

Sealed joints shall comply with the following requirements:

- A. The seal shall be in planned position.
- B. The seal shall satisfactorily resist the intrusion of foreign material and water.
- C. The seal shall provide bump free passage of traffic.

The manufacturer of the asphaltic plug joint seal shall provide evidence that a minimum of 1500 meters of asphaltic plug joint seal, furnished by the same manufacturer and used in conditions similar to this application, have been installed and have had at least 2 years of satisfactory service.

A technically competent representative of the manufacturer shall be present during installation of the joint seal.

All components of the asphaltic plug joint seal system shall be from one manufacturer.

Materials

The binder shall be either a thermoplastic polymeric modified asphalt, thermoplastic polymer-modified bitumen, polymer modified asphalt sealant, or modified elastomeric binder conforming to the following properties:

| Property | ASTM Test Method | Requirement |
|---------------------------------|--|--|
| Asphalt Compatibility | D 5329 | Pass |
| Bond (Non-immersed) | D 5329 | Pass 3 cycles @ -29°C, 50% Pass 3 cycles @ -18°C, 100% |
| Penetration (Non-immersed) | D 5329 | 1 mm minimum @ -18° ± 1°C, 200 g, 60 sec 9 mm maximum @ 25° ± 1°C, 150 g, 5 sec |
| Ductility | D 113 | 40 cm minimum @ 25° ± 1°C |
| Flexibility | D 5329 (Note: Do not oven age specimen. After 24 hours at standard conditions, allow specimens to condition at -23° ± 1° C for 2 hours before testing) | Pass @ -12° ± 1°C |
| Flow | D 5329 | 3 mm maximum @ 60° ± 1°C, 5 hours |
| Resilience | D 5329 | 40% minimum @ 25° ± 1°C |
| Softening Point | D 36 | 82°C minimum |
| Tensile Adhesion | D 5329 | 550% minimum |
| Safe Heating Temperature | | 199°C to 210°C |
| Recommended Pouring Temperature | | 182°C to 199°C |

Unless otherwise determined by the Engineer in writing, all binder material delivered to the jobsite shall have: written certification that the binder material has been tested and conforms to the requirements of these special provisions; a label clearly showing the manufacturer's name, lot or batch number, date of manufacture, date of packaging; the date, if any, beyond which the binder shall not be used without additional testing and approval; and the manufacturer's instructions for use. The testing and certification shall be performed at an independent testing facility which has been approved by the Engineer. In addition, a sample of binder removed from the same binder material that will be shipped to the jobsite shall be submitted to the Engineer, along with a copy of the certified test report prepared by the independent testing facility. The sample size shall be approximately 4.5 kilograms and be shipped to the Transportation Laboratory 2 weeks prior to shipping binder material to jobsite.

Aggregates shall conform to the provisions in Section 90-2.02A, "Coarse Aggregate," and Section 90-2.02B, "Fine Aggregate," of the Standard Specifications.

The tests for mortar strengths relative to Ottawa Sand test will not be required.

The results of Cleanness Value and Sand Equivalent tests shall meet the requirements for both "Operating Range" and "Contract Compliance."

Aggregates shall be free from deleterious coatings, clay balls, roots, bark, sticks, rags and other extraneous material.

All natural aggregates shall be thoroughly and uniformly double washed and dried before use.

Aggregates shall have not more than 10 percent loss when tested for soundness in conformance with California Test 214.

The soundness requirement for fine aggregate will be waived, provided that the durability index, D_f , of the fine aggregate is 60, or greater.

The aggregate size and gradation shall conform to requirements specified by the manufacturer.

Polyethylene backer rod shall be commercial quality with a continuous, impervious, glazed surface, capable of withstanding the temperature of the hot liquid binder material and suitable for retaining the hot liquid binder while hardening.

The bridging plate shall be steel conforming to the requirements of ASTM Designation: A 36M with a minimum thickness of 6 mm. Plates shall be 200 mm in width and cut in 1250 mm minimum length sections. Holes for the locating pins shall be placed along the longitudinal centerline of the plate at not more than 300 mm on center. The locating pins shall be 88.9 mm common steel nails or larger, or equivalent.

The manufacturer shall furnish certificates of compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for all material used in the asphaltic plug joint seal.

Preparation

The asphalt concrete overlay shall be placed and then saw cut and removed to the dimensions shown on the contract plans. Removal methods shall not damage the existing concrete deck or asphaltic concrete that is to remain in place.

All surfaces of the blockout to receive the asphaltic plug joint seal shall be cleaned by abrasive blasting.

All removed materials, except for surface dust, shall be recovered and disposed of away from the site in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Installation

Immediately prior to placing the joint seal, the horizontal and vertical blockout surfaces to receive the asphaltic plug seal, and the 150 mm of roadway surface adjacent to the blockout shall be cleaned and dried with a hot air lance. The lance used shall be capable of producing a minimum temperature of 1400°C and a directional velocity of 750 meters per second. No moisture shall be present at the time of installation.

The top of the backer rod shall be placed at a minimum depth of 25 mm, and a maximum depth equal to the width of the existing gap, below the bottom of the blockout.

Bridging plate sections shall be centered over the existing gap, butt jointed and placed so that they lay flat on the bottom of the blockout. There shall be no overlaps in the sections or gaps between the plate and blockout.

The required proportioning, heating temperatures, mixing, placement procedures and finishing procedures of the aggregate and binder shall be in conformance with the manufacturer's recommendation.

REINFORCEMENT

Reinforcement shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications

STEEL STRUCTURES

Construction of steel structures shall conform to the provisions in Section 55, "Steel Structures," of the Standard Specifications and these special provisions.

The following substitutions of high-strength steel fasteners shall be made:

| METRIC SIZE SHOWN ON THE PLANS | SIZE TO BE SUBSTITUTED |
|---|---|
| ASTM Designation: A 325M (Nominal bolt diameter (mm or mm x thread pitch)) | ASTM Designation: A 325 (Nominal bolt diameter (inch)) |
| 13 or 12.70, M12, M12 x 1.75 | 1/2 |
| 16 or 15.88, M16, M16 x 2 | 5/8 |
| 19 or 19.05, M20, M20 x 2.5 | 3/4 |
| 22 or 22.22, M22, M22 x 2.5 | 7/8 |
| 24, 25, or 25.40, M24, M24 x 3 | 1 |
| 29 or 28.58, M27, M24 x 3 | 1 1/8 |
| 32 or 31.75, M30, M30 x 3.5 | 1 1/4 |
| 38 or 38.10, M36, M36 x 4 | 1 1/2 |

Materials

Structural steel rolled shapes shall conform to the Charpy V-notch impact values specified for steel plate in Section 55-2, "Materials," of the Standard Specifications.

Steel for members, where shown on the plans as fracture critical members, shall conform to the requirements in ANSI/AASHTO/AWS D1.5, Section 12, "AASHTO/AWS Fracture Control Plan (FCP) for Non-Redundant Members." Charpy V-notch (CVN) impact values for fracture critical members shall conform to the requirements for Zone 2.

High-strength fastener assemblies and other bolts attached to structural steel with nuts and washers shall be zinc-coated. When direct tension indicators are used in these assemblies, the direct tension indicator and all components of the fastener assembly shall be zinc-coated by the mechanical deposition process.

Check Testing

When fracture critical members are shown on the plans, structural steel shall conform to the designated ASTM Standard and the check testing requirements of this section.

Check samples shall be furnished for each heat of maximum thickness of:

- A. Tension flanges and webs of fracture critical members.

Steel plates, shapes, or bars containing check samples shall be furnished from the mill with extra length in order to provide for removal of material for check samples at the point of fabrication. Check samples may be cut from either end of the designated plate, shape, or bar.

At the option of the Contractor, check samples may be removed at the rolling mill rather than at the point of fabrication. The sample will be removed from the mill plate that will be stripped by the fabricator to produce the designated plate and may be taken from any location within that plate. The mill plate from which samples are removed shall be marked with the same identifying numbers as are used on the samples.

Material for check samples shall be removed by the Contractor in the presence of the Engineer. Check samples for plates wider than 610 mm shall be 355 mm wide and 460 mm long with the long dimension transverse to the direction of rolling. Check samples for all other products shall be 460 mm long, taken in the direction of rolling, and the width shall be the product width. Check samples shall be removed and delivered to the Engineer before the material is fabricated into components. The direction of rolling, heat numbers, and plate numbers shall be marked on the samples with paint or other indelible marking material or may be steel stamped in one corner of the plate.

Check samples shall be delivered to the Transportation Laboratory at the Contractor's expense. The check samples will be tested by the Transportation Laboratory for compliance with the requirements specified in ASTM and these special provisions. Check sample test results will be reported to the Contractor within 3 weeks of delivery to the Transportation Laboratory. In the event several samples are submitted on the same day, an additional day will be added for every 2 samples submitted. The test report will be made for the group of samples.

The results of the tensile and impact tests shall not vary more than 5 percent below the specified minimum or 5 percent above the specified maximum requirements. If the initial check test results vary more than 5 percent but not more than 10 percent from the specified requirements, a retest may be performed on another sample from the same heat and thickness. The results of the retest shall not vary more than 5 percent from the original specified requirements. If the results of check tests exceed these permissible variations, material planned for use from the heat represented by said check samples shall be subject to rejection.

Rotation Capacity Testing Prior to Shipment to Job Site

Rotational capacity tests shall be performed on all lots of high-strength fastener assemblies prior to shipment of these lots to the project site. Zinc-coated assemblies shall be tested after all fabrication, coating, and lubrication of components has been completed. One hardened washer shall be used under each nut for the tests.

Each combination of bolt production lot, nut lot, and washer lot shall be tested as an assembly.

A rotational capacity lot number shall be assigned to each combination of lots tested. Each shipping unit of fastener assemblies shall be plainly marked with the rotational capacity lot number.

Two fastener assemblies from each rotational capacity lot shall be tested.

The following equipment, procedure, and acceptance criteria shall be used to perform rotational capacity tests on and determine acceptance of long bolts. Fasteners are considered to be long bolts when full nut thread engagement can be achieved when installed in a bolt tension measuring device:

A. Long Bolt Test Equipment:

1. Calibrated bolt tension measuring device with adequate tension capacity for the bolts being tested.
2. Calibrated dial or digital torque wrench. Other suitable tools will be required for performing Steps 7 and 8 of the Long Bolt Test Procedure. A torque multiplier may be required for large diameter bolts.
3. Spacer washers or bushings. When spacer washers or bushings are required, they shall have the same inside diameter and equal or larger outside diameter as the appropriate hardened washers conforming to the requirements in ASTM Designation: F436.
4. Steel beam or member, such as a girder flange or cross frame, to which the bolt tension measuring device will be attached. The device shall be accessible from the ground.

B Long Bolt Test Procedure:

1. Measure the bolt length. The bolt length is defined as the distance from the end of the threaded portion of the shank to the underside of the bolt head.
2. Install the nut on the bolt so that 3 to 5 full threads of the bolt are located between the bearing face of the nut and the underside of the bolt head. Measure and record the thread stickout of the bolt. Thread stickout is determined by measuring the distance from the outer face of the nut to the end of the threaded portion of the shank.

3. Insert the bolt into the bolt tension measuring device and install the required number of washers, and additional spacers as needed, directly beneath the nut to produce the thread stickout measured in Step 2 of this procedure.
4. Tighten the nut using a hand wrench to a snug-tight condition. The snug tension shall not be less than the Table A value but may exceed the Table A value by a maximum of 2 kips.

Table A

| High-Strength Fastener Assembly Tension Values to Approximate Snug-Tight Condition | |
|--|---------------------|
| Bolt Diameter (inches) | Snug Tension (kips) |
| 1/2 | 1 |
| 5/8 | 2 |
| 3/4 | 3 |
| 7/8 | 4 |
| 1 | 5 |
| 1 1/8 | 6 |
| 1 1/4 | 7 |
| 1 3/8 | 9 |
| 1 1/2 | 10 |

5. Match-mark the assembly by placing a heavy reference start line on the face plate of the bolt tension measuring device which aligns with 1) a mark placed on one corner of the nut, and 2) a radial line placed across the flat on the end of the bolt, or on the exposed portions of the threads of tension control bolts. Place an additional mark on the outside of the socket that overlays the mark on the nut corner such that this mark will be visible while turning the nut. Make an additional mark on the face plate, either 2/3 of a turn, one turn, or 1 1/3 turn clockwise from the heavy reference start line, depending on the bolt length being tested as shown in Table B.

Table B

| Required Nut Rotation for Rotational Capacity Tests ^(a,b) | |
|---|--------------------------|
| Bolt Length (measured in Step 1) | Required Rotation (turn) |
| 4 bolt diameters or less | 2/3 |
| Greater than 4 bolt diameters but no more than 8 bolt diameters | 1 |
| Greater than 8 bolt diameters, but no more than 12 bolt diameters ^(c) | 1 1/3 |
| <p>(a) Nut rotation is relative to bolt, regardless of the element (nut or bolt) being turned. For bolts installed by 1/2 turn and less, the tolerance shall be plus or minus 30 degrees; for bolts installed by 2/3 turn and more, the tolerance shall be plus or minus 45 degrees.</p> <p>(b) Applicable only to connections in which all material within grip of the bolt is steel.</p> <p>(c) When bolt length exceeds 12 diameters, the required rotation shall be determined by actual tests in a suitable tension device simulating the actual conditions.</p> | |

6. Turn the nut to achieve the applicable minimum bolt tension value listed in Table C. After reaching this tension, record the moving torque, in foot-pounds, required to turn the nut, and also record the corresponding bolt tension value in pounds. Torque shall be measured with the nut in motion. Calculate the value, T (in ft-lbs), where $T = [(\text{the measured tension in pounds}) \times (\text{the bolt diameter in inches}) / 48 \text{ in/ft}]$.

Table C

| Minimum Tension Values for High-Strength Fastener Assemblies | |
|--|------------------------|
| Bolt Diameter (inches) | Minimum Tension (kips) |
| 1/2 | 12 |
| 5/8 | 19 |
| 3/4 | 28 |
| 7/8 | 39 |
| 1 | 51 |
| 1 1/8 | 56 |
| 1 1/4 | 71 |
| 1 3/8 | 85 |
| 1 1/2 | 103 |

7. Turn the nut further to increase bolt tension until the rotation listed in Table B is reached. The rotation is measured from the heavy reference line made on the face plate after the bolt was snug-tight. Record this bolt tension.
8. Loosen and remove the nut and examine the threads on both the nut and bolt.

C. Long Bolt Acceptance Criteria:

1. An assembly shall pass the following requirements to be acceptable: 1) the measured moving torque (Step 6) shall be less than or equal to the calculated value, T (Step 6), 2) the bolt tension measured in Step 7 shall be greater than or equal to the applicable turn test tension value listed in Table D, 3) the nut shall be able to be removed from the bolt without signs of thread stripping or galling after the required rotation in Step 7 has been achieved, 4) the bolt does not shear from torsion or fail during the test, and 5) the assembly does not seize before the final rotation in Step 7 is reached. Elongation of the bolt in the threaded region between the bearing face of the nut and the underside of the bolt head is expected and will not be considered a failure. Both fastener assemblies tested from one rotational capacity lot shall pass for the rotational capacity lot to be acceptable.

Table D

| Turn Test Tension Values | |
|--------------------------|--------------------------|
| Bolt Diameter (inches) | Turn Test Tension (kips) |
| 1/2 | 14 |
| 5/8 | 22 |
| 3/4 | 32 |
| 7/8 | 45 |
| 1 | 59 |
| 1 1/8 | 64 |
| 1 1/4 | 82 |
| 1 3/8 | 98 |
| 1 1/2 | 118 |

The following equipment, procedure, and acceptance criteria shall be used to perform rotational capacity tests on and determine acceptance of short bolts. Fasteners are considered to be short bolts when full nut thread engagement cannot be achieved when installed in a bolt tension measuring device:

A. Short Bolt Test Equipment:

1. Calibrated dial or digital torque wrench. Other suitable tools will be required for performing Steps 7 and 8 of the Short Bolt Test Procedure. A torque multiplier may be required for large diameter bolts.
2. Spud wrench or equivalent.
3. Spacer washers or bushings. When spacer washers or bushings are required, they shall have the same inside diameter and equal or larger outside diameter as the appropriate hardened washers conforming to the requirements in ASTM Designation: F436.
4. Steel plate or girder with a hole to install bolt. The hole size shall be 1.6 mm greater than the nominal diameter of the bolt to be tested. The grip length, including any plates, washers, and additional spacers as needed, shall provide the proper number of threads within the grip, as required in Step 2 of the Short Bolt Test Procedure.

B. Short Bolt Test Procedure:

1. Measure the bolt length. The bolt length is defined as the distance from the end of the threaded portion of the shank to the underside of the bolt head.
2. Install the nut on the bolt so that 3 to 5 full threads of the bolt are located between the bearing face of the nut and the underside of the bolt head. Measure and record the thread stickout of the bolt. Thread stickout is determined by measuring the distance from the outer face of the nut to the end of the threaded portion of the shank.
3. Install the bolt into a hole on the plate or girder and install the required number of washers and additional spacers as needed between the bearing face of the nut and the underside of the bolt head to produce the thread stickout measured in Step 2 of this procedure.
4. Tighten the nut using a hand wrench to a snug-tight condition. The snug condition shall be the full manual effort applied to the end of a 305 mm long wrench. This applied torque shall not exceed 20 percent of the maximum allowable torque in Table E.

Table E

| Maximum Allowable Torque for High-Strength Fastener Assemblies | |
|--|-----------------|
| Bolt Diameter (inches) | Torque (ft-lbs) |
| 1/2 | 145 |
| 5/8 | 285 |
| 3/4 | 500 |
| 7/8 | 820 |
| 1 | 1220 |
| 1 1/8 | 1500 |
| 1 1/4 | 2130 |
| 1 3/8 | 2800 |
| 1 1/2 | 3700 |

5. Match-mark the assembly by placing a heavy reference start line on the steel plate or girder which aligns with 1) a mark placed on one corner of the nut and 2) a radial line placed across the flat on the end of the bolt or on the exposed portions of the threads of tension control bolts. Place an additional mark on the outside of the socket that overlays the mark on the nut corner such that this mark will be visible while turning the nut. Make 2 additional small marks on the steel plate or girder, one 1/3 of a turn and one 2/3 of a turn clockwise from the heavy reference start line on the steel plate or girder.

6. Using the torque wrench, tighten the nut to the rotation value listed in Table F. The rotation is measured from the heavy reference line described in Step 5 made after the bolt was snug-tight. A second wrench shall be used to prevent rotation of the bolt head during tightening. Measure and record the moving torque after this rotation has been reached. The torque shall be measured with the nut in motion.

Table F

| Nut Rotation Required for Turn-of-Nut (a,b) Installation | |
|--|--------------------------|
| Bolt Length (measured in Step 1) | Required Rotation (turn) |
| 4 bolt diameters or less | 1/3 |
| (a) Nut rotation is relative to bolt, regardless of the element (nut or bolt) being turned. For bolts installed by 1/2 turn and less, the tolerance shall be plus or minus 30 degrees. | |
| (b) Applicable only to connections in which all material within grip of the bolt is steel. | |

7. Tighten the nut further to the 2/3-turn mark as indicated in Table G. The rotation is measured from the heavy reference start line made on the plate or girder when the bolt was snug-tight. Verify that the radial line on the bolt end or on the exposed portions of the threads of tension control bolts is still in alignment with the start line.

Table G

| Required Nut Rotation for Rotational Capacity Test | |
|--|--------------------------|
| Bolt Length (measured in Step 1) | Required Rotation (turn) |
| 4 bolt diameters or less | 2/3 |

8. Loosen and remove the nut and examine the threads on both the nut and bolt.

C. Short Bolt Acceptance Criteria:

1. An assembly shall pass the following requirements to be acceptable: 1) the measured moving torque from Step 6 shall be less than or equal to the maximum allowable torque from Table E, 2) the nut shall be able to be removed from the bolt without signs of thread stripping or galling after the required rotation in Step 7 has been achieved, 3) the bolt does not shear from torsion or fail during the test, and 4) the assembly shall not seize before the final rotation in Step 7 is reached. Elongation of the bolt in the threaded region between the bearing face of the nut and the underside of the bolt head will not be considered a failure. Both fastener assemblies tested from one rotational capacity lot shall pass for the rotational capacity lot to be acceptable.

Installation Tension Testing and Rotational Capacity Testing After Arrival on the Job Site

Installation tension tests and rotational capacity tests on high-strength fastener assemblies shall be performed by the Contractor prior to acceptance or installation and after arrival of the fastener assemblies on the project site. Installation tension tests and rotational capacity tests shall be performed at the job-site, in the presence of the Engineer, on each rotational capacity lot of fastener assemblies.

Installation tension tests shall be performed on 3 representative fastener assemblies in conformance with the provisions in Section 8, "Installation," of the RCSC Specification. For short bolts, Section 8.2, "Pretensioned Joints," of the RCSC Specification shall be replaced by the "Pre-Installation Testing Procedures," of the "Structural Bolting Handbook," published by the Steel Structures Technology Center, Incorporated.

The rotational capacity tests shall be performed in conformance with the requirements for rotational capacity tests in "Rotational Capacity Testing Prior to Shipment to Job Site" of these special provisions.

At the Contractor's expense, additional installation tension tests, tests required to determine job inspecting torque, and rotational capacity tests shall be performed by the Contractor on each rotational capacity lot, in the presence of the Engineer, if 1) any fastener is not used within 3 months after arrival on the jobsite, 2) fasteners are improperly handled, stored, or subjected to inclement weather prior to final tightening, 3) significant changes are noted in original surface condition of threads, washers, or nut lubricant, or 4) the Contractor's required inspection is not performed within 48 hours after all fasteners in a joint have been tensioned.

Failure of a job-site installation tension test or a rotational capacity test will be cause for rejection of unused fasteners that are part of the rotational capacity lot.

When direct tension indicators are used, installation verification tests shall be performed in conformance with Appendix Section X1.4 of ASTM Designation: F959, except that bolts shall be initially tensioned to a value 5 percent greater than the minimum required bolt tension.

Surface Preparation

For all bolted connections, the contact surfaces and inside surfaces of bolt holes shall be cleaned and coated before assembly in conformance with the provisions for cleaning and painting structural steel of these special provisions.

Sealing

The perimeter around all direct tension indicator gaps shall be completely sealed with non-silicone type sealing compound conforming to the provisions in Federal Specification TT-S-230, Type II. The sealant shall be gray in color and have a minimum thickness of 1.3 mm. If painting is required, the sealing compound shall be applied prior to painting.

When zinc-coated tension control bolts are used, the sheared end of each fastener shall be completely sealed with non-silicone type sealing compound conforming to the provisions in Federal Specification TT-S-230, Type II. The sealant shall be gray in color and shall have a minimum thickness of 1.3 mm. The sealant shall be applied to a clean sheared surface on the same day that the splined end is sheared off.

PROTECTIVE SHIELD

The protective shields shall prevent any debris from the work on the south edge girder from falling into public traffic, private or public property, or the San Francisco Bay. The protective shields shall be designed to remain as a permanent component of the south edge girder support. The protective shields shall have a minimum strength equivalent to that provided by good, sound Douglas fir planking having a nominal thickness of 50 mm. Additional layers of material shall be furnished as necessary to prevent fine materials or debris from passing through the protective shields.

The design and construction of the protective shields as specified herein shall not relieve the Contractor of responsibilities specified in Section 7-1.12A, "Indemnification," and Section 7-1.12B, "Insurance," of the Standard Specifications.

The Contractor shall submit working drawings, with design calculations, to the Engineer for the proposed protective shields. The working drawings and design calculations shall be prepared and signed by an engineer who is registered as a Civil Engineer in the State of California. The design calculations shall be adequate to demonstrate the stability and durability of the protective shields for the life of the south edge girder support.

The protective shield working drawings shall conform to the provisions under the heading "Submittals," of these special provisions. The number of sets of drawings, design calculations, the time for reviewing protective shield working drawings shall be the same as specified for falsework working drawings in Section 51-1.06A, "Falsework Design and Drawings," of the Standard Specifications.

CLEAN AND PAINT STRUCTURAL STEEL

Exposed new metal surfaces, except where galvanized, shall be cleaned and painted in conformance with the provisions in Section 59-2, "Painting Structural Steel," and Section 91, "Paint," of the Standard Specifications and these special provisions.

Prior to performing any painting or paint removal, the Contractor shall submit to the Engineer, in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications, 3 copies of a separate Painting Quality Work Plan (PQWP) for each item of work for which painting or paint removal is to be performed. As a minimum, each PQWP shall include the following:

- A. The name of each Contractor or subcontractor to be used.
- B. One copy each of all current "SSPC: The Society for Protective Coatings" specifications or qualification procedures which are applicable to the painting or paint removal to be performed. These documents shall become the permanent property of the Department.
- C. Proposed methods and equipment to be used for any paint application.
- D. Proof of each of any required certifications, SSPC-QP 1, SSPC-QP 2, SSPC-QP 3.
 - 1. In lieu of certification in conformance with the requirements in SSPC-QP 1 for this project, the Contractor may submit written documentation showing conformance with the requirements in Section 3, "General Qualification Requirements," of SSPC-QP 1.
 - 2. In lieu of certification in conformance with the requirements in SSPC-QP 2 for this project, the Contractor may submit written documentation showing conformance with the requirements in Sections 4.2 through 4.6 of SSPC-QP 2.

The Engineer shall have 2 weeks to review the PQWP submittal after a complete plan has been received. No painting or paint removal shall be performed until the PQWP for that work is reviewed by the Engineer. Should the Engineer fail to complete the review within this time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the PQWP, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Cleaning

Exposed new metal surfaces shall be dry blast cleaned in conformance with the requirements in Surface Preparation Specification No. 10, "Near White Blast Cleaning," of the "SSPC: The Society for Protective Coatings." Blast cleaning shall leave surfaces with a dense, uniform, angular anchor pattern of not less than 40 μm nor more than 86 μm as measured in conformance with the requirements in ASTM Designation: D 4417.

Mineral and slag abrasives used for blast cleaning steel shall conform to the requirements in Abrasive Specification No. 1, "Mineral and Slag Abrasives," of the "SSPC: The Society for Protective Coatings" and shall not contain hazardous material. Mineral and slag abrasives shall comply with the requirements for Class A, Grade 2 to 3 as defined therein.

A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications and a Material Safety Data Sheet shall be furnished prior to use for each shipment of blast cleaning material for steel.

The inside surfaces of bolt holes shall be cleaned in conformance with the requirements in Surface Preparation Specification No. 1, "Solvent Cleaning," of the "SSPC: The Society for Protective Coatings," and visible rust shall be removed.

Painting

Blast cleaned surfaces shall receive a single undercoat consisting of a waterborne inorganic zinc coating conforming to the requirements in AASHTO Designation M 300, Type II, except that: 1) the first 3 sentences of Section 4.7, "Primer Field Performance Requirements," and the entire Section 4.7.1 shall not apply, and 2) zinc dust shall be Type II in conformance with the requirements in ASTM Designation: D 520. The inorganic zinc coating shall be listed on the qualified products list which may be obtained from the Transportation Laboratory.

The inside surfaces of bolt holes shall be painted with one application of a zinc rich primer (organic vehicle type) after the application of the undercoat of inorganic zinc on adjacent steel. The steel surfaces adjacent to the bolt holes shall be kept clean and protected from drippings during the application of the primer.

The color of the final application of inorganic zinc coating shall match Federal Standard 595B No. 36373.

Inorganic zinc coating shall be used within 12 hours of initial mixing.

Application of inorganic zinc coating shall conform to the provisions for applying zinc-rich coating in Section 59-2.13, "Application of Zinc-Rich Primer," of the Standard Specifications.

Inorganic zinc coating shall not be applied when the atmospheric or surface temperature is less than 7°C or more than 29°C, nor when the relative humidity exceeds 85 percent.

The single undercoat of inorganic zinc coating shall be applied to the required dry film thickness in 2 or more applications within 4 hours after blast cleaning.

The total dry film thickness of all applications of the inorganic zinc undercoat, including the surfaces of outside existing members within the grip under bolt heads, nuts and washers, shall be not less than 100 µm nor more than 200 µm, except that the total dry film thickness on each faying (contact) surface of high strength bolted connections shall be between 25 µm and the maximum allowable dry film thickness for Class B coatings as determined by certified testing in conformance with Appendix A of the "Specification for Structural Joints Using ASTM A325 or A490 Bolts" of the Research Council on Structural Connections (RCSC Specification). Unless otherwise stated, all inorganic zinc coatings used on faying surfaces shall meet the slip coefficient requirements for a Class B coating on blast-cleaned steel, as specified in the RCSC Specification. The Contractor shall provide results of certified testing showing the maximum allowable dry film thickness for the Class B coating from the qualifying tests for the coating he has chosen, and shall maintain the coating thickness on actual faying surfaces of the structure at or below this maximum allowable coating thickness.

Areas where mudcracking occurs in the inorganic zinc coating shall be blast cleaned and repainted with inorganic zinc coating to the specified thickness.

Dry spray, or overspray, as defined in the Steel Structures Painting Manual, Volume 1, "Good Painting Practice," of the "SSPC: The Society for Protective Coatings," shall be removed prior to application of subsequent coats or final acceptance. Removal of dry spray shall be by screening or other methods that minimize polishing of the inorganic zinc surface. The dry film thickness of the coating after removal of dry spray shall be in conformance with the provisions for applying the single undercoat, as specified herein.

The inorganic zinc coating shall be tested for adhesion and cure. The locations of the tests will be determined by the Engineer. The sequence of the testing operations shall be determined by the Contractor. The testing for adhesion and cure will be performed no sooner than 72 hours after application of the single undercoat of inorganic zinc coating. At the Contractor's expense, satisfactory access shall be provided to allow the Engineer to determine the location of the tests and to test the inorganic zinc coating cure. The inorganic zinc coating shall pass the following tests:

Adhesion

- The inorganic zinc coating shall have a minimum adhesion to steel of 4 MPa when measured at no more than 6 locations on the south edge girder support using a self-aligning adhesion tester in conformance with the requirements in ASTM Designation: D 4541. The Contractor, at the Contractor's expense, shall: (1) verify compliance with the adhesion requirements, (2) furnish test results to the Engineer, and (3) repair the coating after testing.

Cure

- The inorganic zinc coating, when properly cured, shall exhibit a solid, hard, and polished metal surface when firmly scraped with the knurled edge of a quarter. Inorganic zinc coating that is powdery, soft, or does not exhibit a polished metal surface, as determined by the Engineer, shall be repaired by the Contractor, at the Contractor's expense, by blast cleaning and repainting with inorganic zinc coating to the specified thickness.

Finish coats will not be required.

MEASUREMENT AND PAYMENT

South Edge Girder Support will be paid for on the basis of lump sum.

The contract lump sum price paid for South Edge Girder Support shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in constructing the south edge girder support, complete in place, as shown on the contract plans, and as specified in the standard specifications, and these special provisions, and as directed by the Engineer.

10-1.521 OPEN GRADED ASPHALT CONCRETE

Where open graded asphalt concrete is required to achieve the design criteria for the Temporary Bypass Structure (TBS) as shown on the plans, open graded asphalt concrete surfacing shall be furnished and placed in conformance with the provisions in Section 39, "Asphalt Concrete," of the Standard Specifications and these special provisions. Section 11-1, "Quality Control / Quality Assurance," of these special provisions shall not apply to open graded asphalt concrete.

Vibratory rollers will not be permitted on the bridge decks."

PAYMENT

Full compensation for open graded asphalt concrete shall be considered as included in the contract lump sum prices paid for the various segments of the temporary bypass structure listed in the Engineer's Estimate, and no separate payment will be made therefor.

CONTRACT NO. 04-0120R4
ADDED PER ADDENDUM NO. 9 DATED SEPTEMBER 4, 2003

10-1.522 EPOXY ASPHALT CONCRETE SURFACING

Where epoxy asphalt concrete is required to achieve the design criteria for the Temporary Bypass Structure (TBS) as shown on the plans, epoxy asphalt concrete surfacing shall be furnished and placed in conformance with the provisions in Section 39, "Asphalt Concrete," of the Standard Specifications and these special provisions.

The furnishing of epoxy asphalt concrete surfacing will require the modification of an asphalt concrete batch plant, the use of a special metering mix machine, and the purchasing of epoxy asphalt binder from a sole source supplier in order to provide epoxy asphalt concrete surfacing as specified herein. The placing of epoxy asphalt concrete surfacing will require the use of a special bond coat spray distributor and the purchasing of epoxy asphalt bond coat from a sole source supplier in order to provide epoxy asphalt concrete surfacing as specified herein.

GENERAL

Epoxy asphalt concrete surfacing shall be placed on the entire steel deck, between barriers and to a test area on a Caltrans maintenance roadway located at the Toll Plaza of the San Francisco-Oakland Bay Bridge, as designated by the Engineer.

The epoxy asphalt concrete surfacing shall be placed in two (2) courses, a leveling course and a surface course to the total nominal thickness shown on the plans. The leveling course shall be placed to a variable thickness because of variations in the grade of the steel deck.

Epoxy asphalt binder and bond coat each consist of two separate components, an epoxy resin and a petroleum-derived asphalt with resin hardeners, mixed at high temperatures before being metered into the pug mill as binder or being sprayed on the roadway as bond coat. Both epoxy asphalt binder and bond coat require a very rigid control of mixture, time and temperature.

The binder content of the epoxy asphalt paving mixture shall be between 5.7% and 6.3% by mass of total mix. The Contractor shall determine the binder content to be used per the manufacturer's recommendations and as approved by the Engineer.

The Contractor shall submit a quality control plan in conformance with the requirements in "Quality Control" of this section. The submittal of the quality control plan shall conform to the requirements in "Working Drawings," of these special provisions. At a minimum, the quality control plan shall include the following:

- A. Location of the batch plant
- B. Complete list of modifications to the batch plant controls, tanks, and piping
- C. Methods for controlling epoxy asphalt mix properties including gradation, binder content, mix time, and heat control
- D. Hauling times and distances to the jobsite
- E. Provisions for temperature control and monitoring during hauling
- F. Procedures for controlling temperature and application of bond coat
- G. Lay down procedures for epoxy asphalt paving
- H. Procedures for attaining specified compaction
- I. The names, qualifications, and documentation of certifications for the quality control manager and all quality control inspectors
- J. Details, procedures, and schedules of inspection
- K. Name and address of test facility and qualifications of personnel performing the tests
- L. Details, procedures, and schedules of testing as required by these special provisions
- M. Manufacturer's certificates of compliance for both the binder and bond coat

Prior to submitting the quality control plan, a meeting between the Engineer, Contractor, and epoxy asphalt concrete manufacturer shall be held to discuss the requirements of the quality control plan. The meeting shall be held in the San Francisco Bay Area.

After a complete quality control plan is received by the Engineer, the Contractor shall allow the Engineer 10 (ten) working days to review the submittal. An amended quality control plan or addendum shall be submitted to and approved in writing by the Engineer for proposed revisions to the approved QCP. The Contractor shall allow the Engineer 10 (ten) working days to complete the review of the amended quality control plan or addendum. No epoxy asphalt concrete work shall begin until a preliminary approval has been given, in writing, by the Engineer.

Epoxy asphalt concrete surfacing shall be furnished and installed in accordance with the approved quality control plan, including any amendments and addenda, and the recommendations of the manufacturer's representative.

SOLE SOURCE SUPPLIER

The components for epoxy asphalt binder and bond coat shall be obtained from the following manufacturer:

ChemCo Systems, Inc.
2800 Bay Road
Redwood City, California 94063
Telephone: (650) 261-3790
Fax: (650) 261-3799
Contact: Robert Gaul or John Bors

Arrangements have been made by the State with ChemCo Systems, Inc. to ensure that the successful bidder can obtain the epoxy asphalt bond coat and binder components. The prices quoted by ChemCo Systems, Inc. are as follows:

| | |
|-------------------------|------------------|
| Epoxy asphalt binder | \$5.96/-kilogram |
| Epoxy asphalt bond coat | \$5.96/-kilogram |

Epoxy asphalt binder and bond coat prices include delivery to the batch plant site.

The above unit prices are based on a minimum combined quantity of binder and bond coat of 220,000 kilograms, delivered in bulk to any site within 64 kilometers of the San Francisco-Oakland Bay Bridge. Prices do not include sales tax. Payment terms are net 45 days after delivery of material.

Price and conditions quoted include all discounts and will be firm for all orders placed on or before December 31, 2003 provided delivery is accepted within 24 months after the order is placed. Total price will be increased by 4% for orders placed with ChemCo Systems, Inc. after December 31, 2003 and on or before December 31, 2004 provided that delivery is accepted within 24 months after the order is placed.

The epoxy asphalt bond coat and binder prices quoted include all materials, technical advice, and inspections by a qualified representative of the manufacturer, both at the batch plant and during installation, along with a final inspection of the in-place epoxy asphalt concrete. The prices also include consultation on the quality control plan and manufacturer's certificates of compliance for both the epoxy binder and epoxy bond coat. The prices also include the rental of a meter/mix machine to process the epoxy asphalt binder at the batch plant the rental of a spray distributor machine to apply the bond coat, each for a period of 60 continuous calendar days.

CONTRACT NO. 04-0120R4
ADDED PER ADDENDUM NO. 9 DATED SEPTEMBER 4, 2003

MATERIALS

Epoxy Asphalt Bond Coat and Binder

Epoxy Asphalt Type V shall be used as the binder for epoxy asphalt concrete and Epoxy Asphalt Type Id shall be used as the bond coat, both as supplied by ChemCo Systems, Inc. and which conform to the following specifications:

Epoxy Resin (Part A for Bond Coat and Binder)

| Property | Value | Method |
|---|-------------------|-------------|
| Viscosity @ 23°C. Poise | 110 to 150 | ASTM D 445 |
| Epoxide equivalent weight | 185 to 192 | ASTM D 1652 |
| Color, Gardner. max. | 4 | ASTM D 1544 |
| Moisture content. % max. | 0.05 | ASTM D 1744 |
| Flash point, Cleveland open cup. °C, min. | 200 | ASTM D 92 |
| Specific Gravity @ 23°C. | 1.16 to 1.17 | ASTM D 1475 |
| Appearance. | Transparent amber | Visual |

Part B for Bond Coat and Binder

| | Bond Coat | Binder | |
|---|--------------|--------------|-------------|
| Product Designation | Type Id | Type V | |
| Property | Value | Value | Method |
| Viscosity @ 100°C. cP, min. | 800 | 140 | Brookfield |
| Specific Gravity @ 23°C | 0.98 to 1.02 | 0.98 to 1.02 | ASTM D 1475 |
| Color | Black | Black | Visual |
| Acid Value, mg KOH/g. | 60 to 80 | 40 to 60 | ASTM 664 |
| Flash Point, Cleveland open cup. °C, min. | 250 | 200 | ASTM D 92 |

Parts A and B Combined and Cured

| | Bond Coat | Binder | |
|--|----------------|----------------|----------------------------------|
| Product Designation | Type Id | Type V | |
| Property | Value | Value | Method |
| Weight Ratio, Parts A/B | 100/445 | 100/585 | |
| Tensile Strength @ 23°C. MPa, min. | 6.90 | 1.52 | ASTM D 638 |
| Elongation at break @ 23°C. % min. | 180 | 200 | ASTM D 638 |
| Viscosity increase to 1000 cP @ 121°C, Minutes, min. | 20 | 50 | See Testing |
| Thermoset Property @ 300°C | Shall not melt | Shall not melt | Small sample placed on hot plate |

Notes: Min = minimum max. = maximum cP = centipoise

Component Part A shall be a liquid diepoxy resin obtained entirely from the condensation of bisphenol A and epichlorohydrin. No diluents, flexibilizers, or plasticizers shall be present. Component Part A shall contain no inorganic fillers, pigments, or other contaminants or insolubles. Component Part A shall be the same for the Type Id bond coat and Type V binder.

Component Part B shall be a homogenous composition of a petroleum-derived asphalt and epoxy resin hardeners. Component Part B shall contain no insolubles such as inorganic fillers or pigments, and no contaminants which would adversely affect automatic metering, mixing, or dispensing.

Components Part A and Part B shall be mixed and applied as specified by the manufacturer and these special provisions.

Specimens for tensile cast sheets of bond material shall be prepared in accordance with the manufacturers recommendation and the following:

- A. Two glass sheets (305 mm X 305 mm X 6.35 mm) shall be coated with a suitable spray-on dry_film mold release.
- B. A seal to contain the liquid shall be formed by threading a length of copper or annealed iron wire through a length of latex rubber tubing 3 mm I.D. and 0.75 mm wall thickness. The seal shall be bent into a U-shape and shall be placed to within 25 mm of three edges of the plate.
- C. Three 2.3 mm spacers shall be placed between the seal and the edges of the plate. The second plate shall be placed on top of the assembly with the coated side down. The assembly shall be firmly clamped together and placed in an oven at 121°C for at least 1 hour but no longer than 5 hours to avoid damage to the rubber seal.
- D. The heated assembly shall be removed from the oven and the prepared binder poured into the mold. The mold shall be returned to the oven at 121°C and cured for 4 hours with the mold assembly in the vertical position.
- E. After 4 hours the mold shall be taken from the oven and the clamps removed immediately. The mold shall be allowed to cool for no less than 15 minutes then the spacers shall be removed and the glass plates shall be carefully pried apart. The exposed side shall be dusted with powdered talc and the casting carefully removed from the other plate and the reverse side dusted with talc. The wire in the gasket shall be cut at the two corners and removed from the latex tubing. Brush off excess talc and place the casting on a clean flat surface.
- F. The casting shall be allowed to cool to room temperature and age for a minimum of 10 hours. The Contractor shall cut dumbbell shaped specimens from the casting in accordance with the requirements in ASTM Designation: D412 using a C die. Cut specimens shall be laid out flat and straight and stored at a temperature of 23 +/- 2 °C for a minimum of 12 hours before testing.

Aggregates

Aggregates for epoxy asphalt concrete surfacing shall conform to Section 39-2.02, "Aggregate," of the Standard Specifications and these special provisions.

Aggregates shall be obtained from the following quarries or equal, as determined by the Engineer:

- A. Dumbarton Quarry
- B. Brisbane Quarry

Aggregates shall consist of 100% crushed particles. Elongated particles with an aspect ratio of greater than 1 to 3 should be no more than 5% of all aggregate particles by weight.

The combined aggregate grading shall conform to the following gradation immediately prior to mixing with the epoxy asphalt binder:

Grading Limits of Combined Aggregates
9.5-mm Maximum

| Sieve Sizes (mm) | Percentage Passing |
|------------------|--------------------|
| 12.5 | 100 |
| 9.5 | 95-100 |
| 4.75 | 65-85 |
| 2.36 | 50-70 |
| 600 µm | 28-40 |
| 75 µm | 7-14 |

The aggregate shall conform to the following quality requirements prior to addition of the epoxy asphalt:

| Aggregate Quality Requirements | | |
|---|-----------------|-------------|
| Test | California Test | Requirement |
| Loss in Los Angeles Rattler (after 100 revolutions) | 211 | 7% Max |
| Loss in Los Angeles Rattler (after 500 revolutions) | 211 | 22% Max |
| Sand Equivalent: | 217 | |
| A. Individual Test Results | 217 | 42 min. |
| B. Moving Average Result | 217 | 45 min. |
| Film Stripping (Max.)* | 302 | 25 % |

* After mixing with AR 4000 paving asphalt

If the results of either or both the aggregate grading and Sand Equivalent tests do not meet the requirements specified, the Contractor shall immediately stop paving operations and the Engineer may require removal of the epoxy asphalt concrete that is represented by the tests.

In addition, the aggregate from each separate batch plant bin used for epoxy asphalt concrete, except for the bin containing the fine material, shall have a Cleanness Value of 57 minimum for "contract compliance" and a 65 minimum for "operating range" as determined by California Test 227, modified as follows:

- A. Tests shall be performed on the material retained on the 2.36-mm sieve from each batch plant bin and shall not be a combined or averaged result.
- B. Each test specimen shall be prepared by hand shaking for 30 seconds, a single loading of the entire sample on a 300 mm diameter, 4.75 mm sieve, nested on top of a 300 mm diameter, 2.36 mm sieve.

Where a coarse aggregate batch plant bin contains material which will pass the maximum size specified and be retained on a 9.5-mm sieve, the test specimen mass and volume of wash water specified for 25 mm x 4.75 mm aggregate size shall be used.

Samples shall be obtained from the batch plant weigh box area during or immediately after discharge from each bin of the batch plant.

If the results of the Cleanness Value tests do not meet the requirements specified for "operating range" but meet the "contract compliance" requirements, placement of the material may be continued for the remainder of that day. However, another day's work may not be started until tests, or other information, indicate to the satisfaction of the Engineer that the next material to be used in the work will comply with the requirements specified for "operating range."

If the results of the Cleanness tests do not meet the requirements for "contract compliance" specified, the Contractor shall immediately stop paving operations and the Engineer may require removal of the epoxy asphalt concrete that is represented by the tests.

Supplemental fine aggregate shall be added to the aggregate as required to conform to the gradation limits specified. Supplemental fine aggregate shall conform to Section 39-3.01, "Storage," and Section 39-3.03A, "Proportioning for Batch Mixing," of the Standard Specifications and the following:

Supplemental fine aggregate shall be ground limestone consisting of a minimum of 90% calcium carbonate, containing no active lime and conforming to the following requirements immediately prior to mixing:

| Supplemental Fine Aggregate Requirements | | |
|--|-----------------|-------------|
| Test | California Test | Requirement |
| Composition by mass | 202 | 100% |
| Percentage Passing 300 μ m Sieve | 202 | 90-100 |
| Surface Area (sq. meter per kg) | 340 | 29 Max |
| Specific Gravity | 208 | 2.5 Min. |
| Moisture Content (%) | 226 | 0.2 Max. |

The addition of ground limestone will be limited to 4% of the aggregate batch mass.
The addition of bag house dust will be limited to 1% of the aggregate batch mass.

Composite Properties of Epoxy Asphalt Concrete

Epoxy asphalt concrete in the fully cured condition, as defined by the manufacturer, shall have the following properties:

| Properties of Fully Cured Epoxy Asphalt Concrete | | |
|--|----------------|-----------------|
| Property | Value (Type V) | Test Method |
| Marshall stability at 60°C, kN, minimum | 40.0 | ASTM D1559-91 |
| Flow value at 60°C, mm, minimum | 2.0 | ASTM D1559-91 |
| Recovery at 60°C, percent, minimum | 60 | ASTM D1559-91 |
| Percent air voids total mix, maximum | 3.0 | ASTM D3203/1188 |

The Contractor shall also prepare specimens for testing of uncured epoxy asphalt as follows:

- A. Collect specimen material immediately after discharge from pug mill
- B. Place specimen in a chamber at a controlled temperature of 115°C \pm 2°C within 5 minutes of collection.
- C. Specimen shall remain at the specified controlled temperature for a minimum of 60 minutes and a maximum of 70 minutes.
- D. Compact specimen and allow to cool in the molds to 23°C \pm 2°C. Cooling in water will not be permitted.
- E. Test shall be performed within 2 hours of reaching 25°C.

The uncured epoxy asphalt concrete shall have the following properties:

| Properties of Uncured Epoxy Asphalt Concrete | | |
|--|----------------|---------------|
| Property | Value (Type V) | Test Method |
| Marshall Stability at 60°C, kN, minimum | 5.34 | ASTM D1559-91 |
| Flow value at 60°C, mm, minimum | 2.0 | ASTM D1559-91 |

Storage, Proportioning and Mixing Materials

General – Epoxy asphalt concrete shall be produced in a batch mixing plant.

1. Storage - Aggregate shall be stored in accordance with Sections 39-3.01, "Storage," 39-3.01A, "Cold Storage," and 39-3.01B, "Hot Storage," of the Standard Specifications. For storage purposes, aggregates shall be considered Type A.

Aggregate shall be stored so that separately sized aggregates will not be intermingled. Any aggregate that has intermingled with another size of aggregate shall be removed and replaced with aggregate of specified grading.

Epoxy asphalt binder and bond coat components shall be stored in separate heated tanks that are free of any contaminants and in accordance with Section 39-3.01C, "Asphalt Binder Storage," of the Standard Specifications and these special provisions. Contaminated materials shall be disposed of in accordance with the requirements of Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications. During the production of epoxy asphalt concrete by the batch plant, the tanks shall be able to maintain the temperature of the Part A (Epoxy Resin) at 82°C to 93°C and the Part B component of the Binder at 138°C to 149°C.

2. Drying - Aggregates shall be dried in accordance with Section 39-3.02, "Drying," of the Standard Specifications.

3. Proportioning - Aggregates and epoxy asphalt shall be proportioned in accordance with Sections 39-3.03, "Proportioning," and Section 39-3.03A, "Proportioning for Batch Mixing," of the Standard Specifications and these special provisions.

The Contractor shall furnish aggregate samples at least 30 days prior to their intended use.

Samples of the proposed aggregate sizes, including bag house dust and limestone dust, shall be sampled and tested for sieve analysis, specific gravity, and quality determination. The Contractor shall determine per the manufacturers recommendation the blend that most nearly fits the optimum hot bin gradations. The blend shall be approved by the Engineer.

After theoretical design gradations have been determined, cold feed trial runs at different gate settings shall be performed until a blending of the resulting hot bin samples produces a gradation in conformance with the mix design gradation. A full production trial run through the plant at operating temperatures shall be performed and samples taken, separated, and tested. The full production trial run shall be completed and approved by the Engineer before starting the Production Trial.

Adjustments to cold feed settings may be necessary depending on the results of daily samples taken from the hot bins and the results from gradations determined from the extracted paving mixture.

4. Mixing –Aggregate, supplemental fine aggregate, bag house dust and epoxy asphalt binder shall be mixed in a central batch mixing plant in accordance with Sections 39-3.04, "Mixing," and Section 39-3.04A, "Batch Mixing," of the Standard Specifications and these special provisions. ChemCo Systems Meter Mix Machine Model MM2.2 shall be installed at the batch plant and shall be used to meter, mix, and inject mixed binder into the pug-mill of the batch plant.

The batch plant shall conform to the provisions of Section 39-3.06, "Asphalt Concrete Plants," of the Standard Specifications and these special provisions. The plant shall be modified to produce epoxy asphalt concrete. The wet mixing cycle, after all epoxy asphalt binder, aggregates and fine aggregate have been loaded into the pug mill, shall be a minimum of 30 seconds. Depending on the mixing efficiency of the pug mill this minimum time may be increased by the Engineer based on the experience from the Production Trial as described elsewhere in the special provisions.

The plant shall be capable of a minimum production of 50 tonnes per hour with a batch capacity of not less than 1 tonne. Flow meters in the feed lines used to proportion the two epoxy components shall be sealed in accordance with the provisions in the fourth paragraph of Section 9-1.01, "Measurement of Quantities," of the Standard Specifications.

The Contractor's attention is directed to the inter-relationship of batch temperature, hauling times and placement temperature for epoxy asphalt concrete specified in these special provisions. To comply with the above constraints, the location of the batch plant is critical and shall be so located that the batch loading, hauling, and placing times shall comply with the time limits specified in "Spreading and Compacting," of this section.

The epoxy asphalt content of the completed mixture shall be determined by California Test 310 modified as follows:

- A. Use samples of 1500g \pm 150g.
- B. Take field samples and mix with extraction solvent within 15 minutes of discharge of the mixture from the pug mill.
- C. Verify that sample is completely submerged in solvent.
- D. Agitate mixture at least once every 15 minutes until extraction is initiated.
- E. Initiate extraction procedure within 90 minutes of discharge of mixture from the pug mill.

Immediately prior to mixing in the meter mix machine, the temperature of the individual components shall be within the following ranges:

- A. Part A component 82°C to 93°C.
- B. Part B component 138°C to 149°C.

The temperature of the aggregate at the time the epoxy asphalt binder is added shall be sufficient to result in at temperature of the mixture as it is discharged from the pug mill between 110°C and 121°C.

Production Trials :

Before epoxy asphalt concrete surfacing operations are started on the deck, the Contractor shall perform production trials which satisfactorily demonstrate to the Engineer that the plant, equipment and procedures to be employed are adequate for proper production, placement, compaction and finishing of epoxy asphalt concrete surfacing. The Contractor shall notify the Engineer, in writing, at least 10 (ten) working days prior to the start of the Production Trial.

The Contractor shall demonstrate his production operations by applying bond coat and placing at least two paving passes of epoxy asphalt concrete surfacing. The total thickness of the paving shall be 50 mm. The location for the paving pass will be the Caltrans maintenance roadway located at the Toll Plaza of the San Francisco-Oakland Bay Bridge. The paving passes shall not begin until the area involved has been prepared in the same manner specified in "Epoxy Asphalt Bond Coat" elsewhere in this specification. Both passes shall be contiguous to each other and a minimum of 3.65 m wide by not less than 50 m long. During the production trials, the Contractor shall demonstrate his ability to make satisfactory longitudinal and transverse construction joints by stopping the placing operations approximately at the mid-point of the test strip, preparing the construction joint, then resuming the placing operations after a one hour waiting period.

Additional paving passes, at no additional cost to the State, may be required if ordered by the Engineer until the Contractor is able to demonstrate satisfactory production, making longitudinal and transverse construction joints, and producing in-place epoxy asphalt conforming to the requirements in these special provisions. The Contractor shall allow 5 (five) working days between the production trial and the start of the surfacing on the deck of the suspension structure for evaluation, testing, and approval by the Engineer.

Epoxy Asphalt Bond Coat.

1. General. Epoxy asphalt bond coat shall be applied to the area to be surfaced, as specified in these special provisions, and per the manufacturer's recommendations.

Epoxy asphalt bond coat shall be applied only when the roadway surface is dry, the atmospheric temperature is at least 10°C, and the roadway surface temperature is above 10°C. If heavy fog or rain is imminent or might be reasonably expected before the bond coat can be covered with finished pavement, the bond coat shall not be applied.

Before application of the bond coat, the bridge railing, new pavement and all other portions of the bridge susceptible to spattering by over spray shall be masked with plastic sheets or other wrapping methods approved by the Engineer, or protected with a traveling shield of a suitable material approved by the Engineer. If over spray does occur, over-sprayed areas shall be cleaned at the Contractor's expense to the satisfaction of the Engineer.

Where the protective paint coating on the steel deck has been damaged, regardless of the cause of damage, the steel shall be painted with one application of a zinc rich primer (organic vehicle type), applied by brush, daubers or spraying as specified in Section 59-2.13, "Application of Zinc-Rich Primer," of the Standard Specifications. The paint shall be thoroughly cured prior to application of the epoxy asphalt bond coat.

Prior to the application of the bond coat, the entire area to be paved shall be swept clean, washed with a 1% solution of nonionic surface active agent (Triton X-100 or equal) and scrubbed with stiff bristle brooms or mechanical sweepers to remove all oil, grease, zinc oxides and loose zinc paint. After washing the entire area shall be rinsed by flushing twice with clean water. The wash water and rinse water shall be prevented from entering storm water conveyances and San Francisco Bay in conformance with the provisions in "Non-storm Water Discharges" of these special provisions.

Areas that have been cleaned and later show contamination prior to application of the bond coat shall be re-cleaned.

Surfaces shall be dry when the bond coat is applied.

Immediately prior to mixing in the Spray Distributor machine, the temperature of the individual components shall be within the following ranges:

- A. Part A component 82°C to 93°C
- B. Part B component 143°C to 157°C

The mixed bond coat shall be applied at a rate of 0.68 liters per square meter on the primed steel deck and 0.45 liters per square meter on the first course, unless directed otherwise by the Engineer.

The bond coating shall be uniform and continuous and shall be applied to all vertical surfaces of existing pavement, curbs, barriers, construction joints in the surfacing against which additional material is to be placed, the deck or pavement to be surfaced, and to other surfaces designated by the Engineer.

Bond coat applications shall be placed sufficiently in advance of paving operations to prevent slippage of the paving machine. Bond coat shall be reapplied if the coated areas are not covered within 3 days. If the bond coat becomes wet after application from rain or condensation the epoxy asphalt concrete shall not be placed until the moisture has evaporated. Bond coat shall be applied to an area not exceeding 75-mm wider than the width of the paving pass.

The applicators of the bond coat shall wear protective clothing, including face shields and dust/mist respirators.

Transporting, Spreading and Compacting

1. General - Spreading and compacting equipment shall conform to the requirements of Section 39-5, "Spreading and Compacting Equipment," of the Standard Specifications and as specified in these special provisions.

Epoxy asphalt concrete surfacing shall be placed in 2 (two) courses. Epoxy asphalt mixtures shall be placed only when the roadway surface is dry, the atmospheric temperature is at least 10°C, and the roadway surface temperature is above 10°C. If heavy fog, rain or temperature drop to below 10°C is imminent or might reasonably be expected before placement can be completed or dew is forming, epoxy asphalt mixtures shall not be placed.

After compaction the Contractor shall remove 75 mm along the longitudinal edge by power cutting a 45-degree slope in a general straight longitudinal line. The Contractor shall also remove 150 mm of transverse joints by power cutting to a vertical face and to a neat line. The longitudinal and transverse joints of the leveling and finish courses shall be off set approximately 150 mm.

At locations where the epoxy asphalt concrete is to be placed over areas inaccessible to spreading and rolling equipment, including the railing edge, the epoxy asphalt concrete shall be spread to obtain the specified results and shall be compacted thoroughly to the required lines, grades and cross sections by means of vibrating rollers, pneumatic tampers, or by other methods that will produce the same degree of compaction as required by these special provisions.

2. Transporting – Epoxy asphalt concrete shall be transported from the batch plant to the job site in haul trucks having tight, clean, smooth container bodies that have been oiled with a minimum amount of thin oil, as recommended by the manufacturer, to prevent adhesion of the surfacing mixture to the truck bodies. Each load of surfacing mixture shall be covered with canvas or other approved material to protect the mixture from the weather and to prevent loss of heat. Any load wetted by rain will be rejected. Haul trucks shall have tires with well-defined treads. Trucks with smooth, bald tires will not be permitted.

Each haul truck shall have three, 10 mm holes drilled in the two side walls of the truck bed through which long-stem (approximately 30 cm) thermometers can be inserted for measuring temperature of the mix in the truck. The holes shall be located 30 ± 5 cm above the bottom of the bed and located at the mid point and 60 ± 10 cm from each end of the truck bed. Before each truck leaves the batch plant long-stem thermometers shall be placed into each of the three holes in the side walls of the truck bed.

In order to reach the paving machine haul trucks must pass over uncured bond coat. To minimize tracking of bond coat from the haul truck tires onto the clean steel deck or freshly paved epoxy asphalt, plywood or other suitable material shall be placed on the deck at the location haul trucks drive off of the uncured bond coat after discharging their load into the paving machine.

Epoxy asphalt concrete shall be discharged directly from the mixer into the hauling vehicle, except a holding container such as a front end loader or other device as approved by the Engineer may be used while verifying mix requirements prior to discharging into the hauling vehicle. The use of a storage silo to accumulate batches will not be permitted.

The allowable time between batching at the plant and placing into the paving machine at the job site is dependent upon the temperature of the batch mixture taken at the batch plant. Batches or portions thereof registering below 110°C or above 121°C when discharged from the pug mill will be rejected. No load or portion of a load shall be placed after the specified reject times.

Allowable times between batching at the plant and placing into the paving machine at the job site for respective temperatures, shall conform to the following:

Time Limits For Making And Transporting Epoxy Asphalt Type V

| Temperature of Mix* Degrees C | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 | 121 |
|----------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Maximum time in minutes | 94 | 90 | 86 | 82 | 79 | 76 | 73 | 70 | 66 | 63 | 60 | 57 |
| Minimum time in minutes | 69 | 66 | 63 | 60 | 58 | 55 | 53 | 51 | 49 | 48 | 46 | 45 |

Notes:

1. *Temperature of Mix is average temperature of all batches in a truck load.
2. Maximum time is the longest time allowable from making first batch in a truckload to emptying truck into paving machine.
3. Minimum time is the shortest time allowable from making first batch in a truckload to emptying truck into paving machine.

The temperature of each load shall be measured as each haul truck reaches the bridge deck using the long stem thermometers that had been inserted through the holes in the truck bed side wall and into the paving mix at the batch plant. If any of the three thermometers are not embedded in the load because of the manner of placement of the load in the truck that reading shall be disregarded in calculating the average temperature. Any load that with a temperature registering below 110°C or above 121°C, based on the average temperature determined with these three temperature readings, will be rejected. Rejected loads shall be removed from the bridge deck.

Each haul truck shall carry a record of the average temperature of all batches in the truck and time of first and last batch into the truck. Any rise in the temperature of a batched mix of epoxy asphalt concrete at the time of placement in the paving machine shall be cause for rejection of the batch by the Engineer.

3. Spreading – Epoxy asphalt concrete mix shall be placed with an asphalt-paving machine as specified herein. The epoxy asphalt mix shall be deposited directly from the haul trucks into the hopper of the paving machine. Depositing the epoxy asphalt mix in a windrow followed by pickup and placement into the hopper of the asphalt-paving machine by loading equipment will not be permitted.

In addition to the requirements in Section 39-5.01, "Spreading Equipment," of the Standard Specifications, epoxy asphalt paving equipment shall be equipped with automatic screed controls and sensing devices.

The deck surface shall be surveyed to determine flatness. If the plane of the deck does not vary more than ± 3 mm over 3.6 m, a ski may be used with the paving machine to control the thickness of the pavement.

When placing epoxy asphalt concrete the automatic controls shall control the longitudinal grade and transverse slope of the screed. Grade and slope references shall be furnished, installed and maintained by the Contractor. Should the Contractor elect to use a ski device, the minimum length of the ski device shall be 10 m. The ski device shall be a one-piece unit and the entire 10-m length shall be utilized in activating the sensor.

When placing epoxy asphalt concrete, on the initial paving pass, the end of the screed nearest the centerline shall be controlled by a sensor activated by a ski device not less than 10-m long. The opposite end of the screed shall be controlled by an automatic transverse slope device set to reproduce the cross slope designated by the Engineer and maintaining the minimum thickness of the course.

When paving contiguously with previously placed mats, the end of the screed adjacent to the previously placed mat shall be controlled by a sensor that responds to the grade of the previously placed mat and will reproduce the grade in the new mat within a 3-mm tolerance. The end of the screed farthest from the previously placed mat shall be controlled in the same manner as when placing the initial mat.

Should the methods and equipment furnished by the Contractor fail to produce a layer of epoxy asphalt concrete conforming to the requirements, including straightedge tolerance required in Section 39-6.03, "Compacting," of the Standard Specifications, the paving operations shall be discontinued and the Contractor shall modify his equipment or furnish substitute equipment in order to achieve the specified results.

Should the automatic screed controls fail to operate properly during any day's work, the Contractor may use manual control of the spreading equipment to place the epoxy asphalt concrete already mixed and on hand. However the equipment shall be corrected or replaced with alternative automatically controlled equipment conforming to the requirements in this section before restarting the batch plant.

The epoxy asphalt concrete shall be placed in 2 (two) lifts. The first course (leveling course) shall establish a uniform finished grade within $25 \text{ mm} \pm 3 \text{ mm}$ of the final grade. The final compacted thickness of the pavement shall be $50 \text{ mm} \pm 3 \text{ mm}$. The minimum thickness of either course shall be 19 mm.

4. Compacting - Rolling shall produce an epoxy asphalt concrete surface of uniform smoothness and density and a pavement that has a maximum 3% air voids, as measured in accordance with ASTM Designation: D3203. The Engineer may require cores to be taken from the completed pavement to measure air void content.

A minimum of two tandem steel-tired rollers weighing not less than 9,000 kg or more than 12,000 kg and two pneumatic-tired roller, all fully operated, shall be furnished for each paving machine operated on the project. Pneumatic tired rollers shall be not less than 1.2 m in width and with all tires of equal size and diameter and shall have a tread approved by the Engineer. Wobble-wheeled rollers will not be permitted. The tires shall be so spaced that the gaps between adjacent tires will be covered by the following tires. The tires shall be inflated to 620 kPa and have an operating mass per tire of not less than 900 kg.

The initial or breakdown compaction for the leveling course shall be performed with a pneumatic-tired roller and shall consist of 3 coverages of the epoxy asphalt concrete, and shall be completed before the temperature of the mix drops below 82°C. The initial or breakdown compaction for the leveling course shall be followed immediately with a steel-tired tandem roller and shall consist of 3 coverages. Final rolling shall be performed with a pneumatic-tired roller and shall consist of 3 coverages before the temperature drops to 65°C.

The initial or breakdown compaction for the surface course shall be performed with a steel-tired tandem roller and shall consist of 3 coverages of the epoxy asphalt concrete, and shall be completed before the temperature of the mix drops below 82°C. The initial or breakdown compaction for the surface course shall be followed immediately with a pneumatic-tired roller and shall consist of 3 coverages. The surface course of the epoxy asphalt concrete shall be compacted additionally without delay by a final rolling consisting of not less than 3 coverages with a steel-tired roller weighing not less than 9,000 kg. and shall be completed before the temperature of the mix drops below 65°C.

Minimum amounts of water shall be used on rollers as required to prevent pickup of paving materials. Additives may be used as release agents provided they are approved by the manufacturer. Rollers shall be equipped with scrapers or brushes to remove any paving material that may be picked up.

Random blisters shall be punctured immediately with a sharp object and the area re-compacted.

If the finished surface of the epoxy asphalt concrete on the traffic lanes does not meet the specified surface tolerances, it shall be brought within tolerance by either (1) abrasive grinding with fog seal coat on the areas which have been ground or (2) removal and replacement. The method will be selected by the Engineer. The corrective work shall be at the Contractor's expense.

If abrasive grinding is used to bring the finished surface to specified surface tolerances, additional grinding shall be performed as necessary to extend the area ground in each lateral direction so that the lateral limits of grinding are at a constant offset from, and parallel to, the nearest lane line or pavement edge, and in each longitudinal direction so that the grinding begins and ends at lines normal to the pavement centerline, within any ground area. All ground areas shall be neat rectangular areas of uniform surface appearance. Abrasive grinding shall conform to the requirements in the first paragraph and the last four paragraphs in Section 42-2.02, "Construction," of the Standard Specifications.

Vehicles and equipment will not be permitted to stand on the freshly paved epoxy asphalt until 48 hours after final rolling.

The Contractor shall remove excess loose material by means of a vacuum sweeper.

Unless otherwise permitted by the Engineer, the use of water to cool the mat will not be permitted.

QUALITY CONTROL

During paving operations, including the Production Trail, samples shall be taken and tested as follows:

- A. Cold feed bins shall be sampled and tested to determine Sand Equivalent, aggregate grading, and Cleanness Value twice each day
- B. Epoxy asphalt concrete mixture shall be sampled and tested in the uncured condition to determine Marshall stability, and flow value twice per 100 tonnes of paving
- C. Epoxy asphalt concrete mixture shall be cured as determined by the manufacturer and tested to determine Marshall stability, flow value, percent recovery and percent air voids twice per 100 tonnes of paving
- D. Extraction shall be performed on the paving mixture in accordance with California Test 310, as modified by these special provisions, and determination made of binder content twice each day
- E. Extraction shall be performed on the paving mixture in accordance with California Test 310, as modified by these special provisions, and sieve analysis performed on the extracted aggregate twice each day
- F. At the start of each day's bond coat application, a sample shall be taken from the spray wand and a tensile sheet cast and tested as specified in "Epoxy Asphalt Bond Coat and Binder" of these special provisions

PAYMENT

Full compensation for epoxy asphalt concrete shall be considered as included in the contract lump sum prices paid for the various segments of the temporary bypass structure listed in the Engineer's Estimate, and no separate payment will be made therefor.

10-1. 66 DRAINAGE FACILITIES

This work shall consist of designing and constructing the drainage facilities and associated grading work for drainage within the construction limits of the Temporary Bypass Structure, including the connection of the deck drain system and drainage facilities to the exiting drainage systems, as necessary to accommodate the Contractor's design of the TBS and to supplement drainage facilities shown on the plans, or as directed by the Engineer.

The drainage facilities shall conform to Section 61, "Culvert and Drainage Pipe Joints," Section 62, "Alternative Culverts," and Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

The Contractor shall submit to the Engineer working drawings and design calculations for the drainage facilities. The adequacy of the drainage facilities as to equivalent strength and capacity shall be subject to approval, in writing, by the Engineer.

Working drawings shall conform to the requirements in "Working Drawings," of these special provisions. The working drawings shall include, but not be limited to, drainage layout, drainage profile, drainage details and drainage quantities.

The Contractor shall allow three weeks after complete drawings and all supporting information for a drainage system are submitted, for the review and approval of the proposed drainage facilities construction.

Should the Engineer fail to complete the review and approval within the time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in working drawing review and approval for the drainage facilities, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays" of the Standard Specifications.

PAYMENT

The contract lump sum price paid for drainage facilities shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in designing and constructing the drainage facilities and grade to drain work within the construction limits of the Temporary Bypass Structure, and as directed by the Engineer.

ENGINEER'S ESTIMATE

04-0120R4

| Item | Item Code | Item | Unit of Measure | Estimated Quantity | Unit Price | Item Total |
|-----------|-----------|---|-----------------|--------------------|------------|------------|
| 61 | 566011 | ROADSIDE SIGN - ONE POST | EA | 28 | | |
| 62 | BLANK | | | | | |
| 63 (S) | 800391 | CHAIN LINK FENCE (TYPE CL-1.8) | M | 6 | | |
| 64 (S) | 800394 | CHAIN LINK FENCE (TYPE CL-1.8, EXTENSION ARM) | M | 70 | | |
| 65 (S) | 802592 | 2.4 M CHAIN LINK GATE (TYPE CL-1.8) | EA | 2 | | |
| 66 | 820107 | DELINEATOR (CLASS 1) | EA | 11 | | |
| 67 | 820134 | OBJECT MARKER (TYPE P) | EA | 3 | | |
| 68 | 833080 | CONCRETE BARRIER (TYPE K) | M | 560 | | |
| 69 (S) | 839603 | CRASH CUSHION (ADIEM) | EA | 2 | | |
| 70 (S) | 840515 | THERMOPLASTIC PAVEMENT MARKING | M2 | 29 | | |
| 71 (S) | 840561 | 100 MM THERMOPLASTIC TRAFFIC STRIPE | M | 3230 | | |
| 72 (S) | 840563 | 200 MM THERMOPLASTIC TRAFFIC STRIPE | M | 380 | | |
| 73 (S) | 840564 | 200 MM THERMOPLASTIC TRAFFIC STRIPE (BROKEN 3.66 M - 0.92 M) | M | 1960 | | |
| 74 (S) | 031088 | 100 MM THERMOPLASTIC TRAFFIC STRIPE (BROKEN 10.48 M - 4.26 M) | M | 3610 | | |
| 75 (S) | 850101 | PAVEMENT MARKER (NON-REFLECTIVE) | EA | 2090 | | |
| 76 (S) | 850102 | PAVEMENT MARKER (REFLECTIVE) | EA | 880 | | |
| 77 | BLANK | | | | | |
| 78 (S) | 031090 | ELECTRICAL WORK (STAGE 2) | LS | LUMP SUM | LUMP SUM | |
| 79 (S) | 031091 | 300 MM WATER MAIN | M | 73 | | |
| 80 (S) | 031092 | 100 MM WATER LINE | M | 74 | | |

ENGINEER'S ESTIMATE**04-0120R4**

| Item | Item Code | Item | Unit of Measure | Estimated Quantity | Unit Price | Item Total |
|--------|-----------|---|-----------------|--------------------|------------|------------|
| 81 (S) | 031093 | 12 NPS WATER MAIN (TEMPORARY BYPASS STRUCTURE) | M | 410 | | |
| 82 (S) | 031094 | 4 NPS WATER LINE (TEMPORARY BYPASS STRUCTURE) | M | 410 | | |
| 83 | BLANK | | | | | |
| 84 | 031695 | SEWER VIDEO SURVEY | LS | LUMP SUM | LUMP SUM | |
| 85 | BLANK | | | | | |
| 86 | 153151 | COLD PLANE ASPHALT CONCRETE PAVEMENT (25 MM MAXIMUM | M2 | 1153 | | |
| 87 | 390102 | ASPHALT CONCRETE (TYPE A) | TONN | 2200 | | |
| 88 | BLANK | | | | | |
| 89 | 120140 | BARRICADE (LEFT IN PLACE) | EA | 4 | | |
| 90 | 032009 | SOUTH EDGE GIRDER SUPPORT | LS | LUMP SUM | LUMP SUM | |
| 91 | 032010 | DRAINAGE FACILITIES | LS | LUMP SUM | LUMP SUM | |
| 92 | 999990 | MOBILIZATION | LS | LUMP SUM | LUMP SUM | |

TOTAL BID (A): _____**TOTAL BID (B):****\$ 100,000.00** x _____**(Cost Per Day) (Enter Working Days Bid)** _____**(Not To Exceed 730 Days)****TOTAL BASIS FOR COMPARISON
OF BIDS: (A+B):** = _____